...EST EXAMPLES IN ARITHMETIC

1001 QUESTIONS AND ANSWERS

REVISED EDITION

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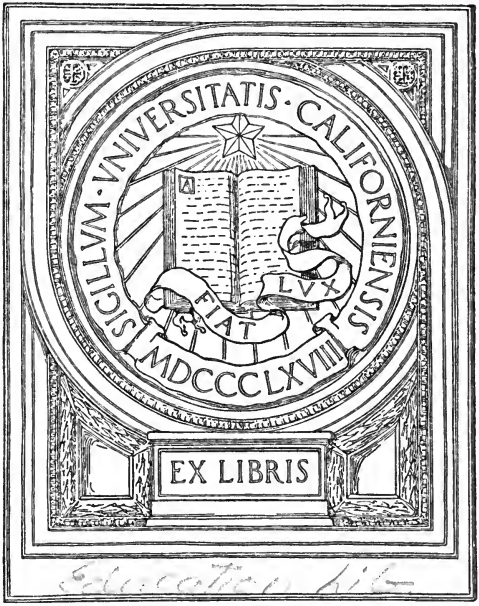

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FRACTIONS.

1. A boy engages to cut each stick of a cord of wood in two pieces at 50 cts. per cord. What should he receive per cord for cutting each stick in three pieces? ANS.: $1.

2. Two consecutive numbers are such that $\frac{1}{4}$ of the less exceeds $\frac{1}{5}$ of the greater by one; find the numbers. ANS.: 80 and 95.

3. Two numbers differ by 28, and one is $\frac{8}{9}$ of the other; find them. ANS.: 252 and 224.

4. Find a number whose $\frac{1}{5}$ part is less than its $\frac{1}{4}$ by 3. ANS.: 60.

5. What number is that whose $\frac{1}{6}$ and $\frac{1}{9}$ are equal to 15? ANS.: 54.

6. $\frac{2}{5}$ of A's money is equal to B's, and $\frac{7}{9}$ of B's is equal to C's; all together have $770; what has each? ANS.: A, $450; B, $180; C, $140.

7. The width of a room is $\frac{2}{3}$ of its length; if the width had been 3 ft. more and the length 3 ft. less the room would have been square. What are the dimensions? ANS.: 12 and 18.

8. A, B and C together have 6450 sheep. C has twice as many as B, and if 120 be taken from A he will have $\frac{1}{3}$ as many as B. How many has each? ANS.: A, 753; B, 1899; C, 3798.

9. The difference between $\frac{1}{2}$ and $\frac{1}{3}$ of a number is 6 less than $\frac{1}{5}$ of the number. What is the number? ANS.: 180.

10. $\frac{2}{3}$ of a number of persons received 15 cts. each and $\frac{1}{3}$ received 9 cts. each. They all received $4.68. How many persons were there? ANS.: 36.

11. If $45 is $\frac{5}{7}$ of my money, what part of it will that sum plus 4\frac{1}{2}$ be? ANS.: $\frac{1}{14}$.

12. A and B can do a piece of work in 12 days. Assuming that A can do $\frac{3}{4}$ as much as B, how long will it take each to do it? ANS.: A, 28; B, 21 da.

13. A and B together had \$5,700. $\frac{2}{3}$ of A's money was equal to $\frac{3}{5}$ of B's. How much had each? ANS.: B, \$3,000; A, \$2,700.

14. A, B and C have \$540. $\frac{1}{3}$ of A's share is equal to $\frac{1}{2}$ of B's and $\frac{3}{4}$ of B's share is equal to $\frac{6}{7}$ of C's. How many dollars has each? ANS.: A, \$240; B, \$160, and C, \$140.

15. Two men found a purse, the contents of which they divided equally. A takes for his share \$1,000, and $\frac{2}{13}$ of remainder. How much did the purse contain? ANS.: \$2,444$\frac{4}{9}$.

16. The sum of two numbers is 490, and one bears the same relation to $\frac{1}{2}$ as the other does to $\frac{3}{4}$. What are the numbers? ANS.: 196 and 294.

17. The sum of two numbers is 1,357. Their difference is $\frac{1}{11}$ of the smaller number. Find the numbers. ANS.: 649 and 708.

18. A sold B a horse for $\frac{1}{5}$ more than it cost him. B sold it to C for \$36, which was $\frac{1}{4}$ less than it cost him. What did A pay for it? ANS.: \$40.

19. A can do a piece of work in 5 days; B can do the same in 7 days. How long will it take them together to do the work? ANS.: $2\frac{1}{12}$ da.

20. A man and his wife use a bag of meal in 16 days; it will last his wife alone 48 days. How long will it last the man? ANS.: 24 da.

21. A's land is $\frac{1}{7}$ less in quantity than D's, but $\frac{1}{20}$ better in quality; how do their farms compare in value. ANS.: A's $\frac{9}{10}$ of D's.

22. If $\frac{2}{3}$ of A's sheep equals $\frac{4}{5}$ of B's, what part of B's equals $\frac{5}{8}$ of A's? ANS.: $\frac{3}{4}$.

23. A has $\frac{2}{3}$ more money than B, and B $\frac{2}{3}$ more than C. How many times C's is A's? ANS.: $2\frac{7}{9}$.

24. $\frac{2}{3}$ of my capital equals $\frac{4}{5}$ of yours; if we put both together what part of the whole will I own? ANS.: $\frac{6}{11}$.

25. After selling $\frac{1}{4}$ and $\frac{1}{5}$ of my horses I had 8 more than I had sold; how many had I at first? ANS.: 80.

26. In 12 years I shall be $\frac{7}{5}$ of my present age; how long since was I $\frac{5}{7}$ of my present age? ANS.: $8\frac{4}{7}$ yrs.

27. Four times $\frac{2}{9}$ of a number is 100 less than twice the number; what is the number? ANS.: 90.

28. A man left $\frac{5}{12}$ of his money to his wife, $\frac{2}{3}$ of the remainder to his son and the balance, $2,100, to his daughters; what was the estate? ANS.: $10,800.

29. I sold an article to A for $\frac{2}{5}$ less than it cost me; A sold it for $21, which was $\frac{2}{5}$ more than it cost him. What did it cost me? ANS.: $25.

30. A is $\frac{1}{4}$ older than B; their father, whose age is equal to the sum of theirs, is 54; how old are A and B? ANS.: 24 and 30.

31. A tree stands $\frac{2}{7}$ under water; the water rose 8 ft., and then there was as much under water as had been above water before. Find height of tree. ANS.: $18\frac{2}{3}$ ft.

32. A is $\frac{4}{5}$ as old as B; if he were 6 yrs. older he would be $\frac{9}{10}$ as old as B; how old is each? ANS.: 48 and 60.

33. A's money is $9 more than $\frac{3}{4}$ of B's and $6 less than $\frac{7}{8}$ of B's; how much has each? ANS.: $99 and $120.

34. $\frac{3}{4}$ of A's age is $\frac{4}{5}$ of B's, and A is 2 yrs. the older. How old is each? ANS.: A, 32; B, 30.

35. If 4 boys do a work in 8 hrs., how long will it take a man who works five times as fast as a boy? ANS.: $6\frac{2}{3}$ hrs.

36. If 10 men can do a work in 5 days, how much time will be saved by employing 2 more? ANS.: $\frac{5}{6}$ da.

37. A left $\frac{3}{5}$ of his estate to his wife; the remainder to his son, who received $900 less than his mother. What was the estate? ANS.: $4,500.

38. B is worth 7 times A; what part of B is $\frac{5}{6}$ of A and B both worth? ANS.: $\frac{5}{11}$.

39. Divide 102 into two such parts that $\frac{2}{3}$ of the first is equal to $\frac{3}{4}$ of the second. ANS.: 54 and 48.

40. What number is that whose $\frac{1}{4}$ increased by 8 is 12 less than its $\frac{1}{2}$. ANS.: 80.

41. Eight men hire a coach; by getting four more passengers their expenses are reduced $1 each. What do they pay for the coach? ANS.: $24.

42. I sell eggs at 10 cts. per doz. and lose $\frac{3}{4}$ ct. apiece. How much must I sell them for to gain $\frac{1}{2}$ ct. apiece? ANS.: 25 cts.

43. One-tenth of a dollar is what part of $2\frac{3}{4}$ cts? ANS.: $\frac{11}{40}$.

44. I gain $\frac{1}{2}$ ct. apiece by selling pears 3 for a dime; how much apiece will I lose by selling them 4 for a dime? ANS.: $\frac{1}{3}$ ct.

45. How much grain must I take to mill so that I shall bring back 6 bu. after paying toll at the rate of 4 qt. to the bu.? ANS.: $6\frac{6}{7}$ bu.

46. After doing $\frac{3}{5}$ of a work in 30 days, I called an assistant; we both completed it in 6 days. In what time could the assistant do it alone? ANS.: $21\frac{3}{7}$ da.

47. The sum of two numbers is 4816. Their difference is $\frac{2}{5}$ of the larger. Find the numbers. ANS.: 3612 and 1204.

48. A can do a piece of work in $\frac{1}{4}$ da., B in $\frac{1}{5}$ and C in a day; in what time can all do it? ANS.: $\frac{1}{10}$.

49. A can do a work in 40 days, B in 60; after both work 3 days A leaves; when must he return that the work may occupy but 30 days? ANS.: At the end of the 13th day.

50. A and B can do a work in 12 days, A and C in 8 days, B and C in 6 days. How long will it take all together to do it? ANS.: $5\frac{1}{3}$ da.

51. A can plow $\frac{3}{5}$ of a field in 6 days, B $\frac{5}{7}$ in 10 days; in what time can they both plow it? ANS.: $5\frac{5}{6}$ da.

52. A and B can cut a field of corn in 12 days, and A alone in 20 days. In what time can B cut it? ANS.: 30 da.

53. A, B and C together do a work in 12 days; A alone can do it in 24 days; B alone in 34; in what time can C do it alone? ANS.: $81\frac{3}{5}$ da.

54. A can mow 3 acres in 4 days, B 5 acres in 6, and C $2\frac{1}{2}$ acres in 5 days. In how many days can the three mow $2\frac{1}{2}$ acres? ANS.: $1\frac{1}{5}$ da.

55. Two-thirds of a number plus $\frac{1}{5}$ of the number plus 34 equals twice the number. What is the number? ANS.: 30

56. The age of B is $2\frac{1}{3}$ times that of A, and the sum of their ages is 76 years; what is the age of each? ANS.: A, 20; B, 56.

57. Divide 88 sheep among A, B and C, giving to B $\frac{2}{3}$, and to C $\frac{3}{7}$ as much as to A. ANS.: A, 42; B, 28, and C, 18.

58. Divide \$440 among three persons, A, B and C, so that the share of A may be $\frac{3}{5}$ that of B, and the share of B $\frac{3}{4}$ that of C. ANS.: A's, \$90; B's, \$150, and C's, \$200.

59. The age of A is twice that of B, and B's twice C's, and the sum of all their ages is 98 years. What is the age of each? ANS.: A, 56; B, 28; and C, 14 yrs.

60. A man having spent \$3 more than $\frac{2}{3}$ of his money had \$7 more than $\frac{1}{5}$ of it left; how much had he at first? ANS.: \$75.

61. It is required to divide 91 into two such parts that the greater, being divided by their difference, the quotient will be 7. ANS.: 49 and 42.

62. Two persons can drink a cask of water in 6 days and one alone in 10 days; how many days will it last the other? ANS.: 15 da.

63. A could mow a field in 20 days, but if B assisted him 6 days he could mow it in 16 days; in how many days could B mow it alone? ANS.: 30 days.

64. What is the value of $\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{5}{6}$ of a pound at \$$\frac{9}{10}$ for $\frac{5}{9}$ of a pound? ANS.: \$$\frac{27}{64}$.

65. If a certain number be diminished by its $\frac{1}{8}$, and $\frac{2}{3}$ of the remainder be added to the first number, the sum will be 18.24; find the number. ANS.: 11.52.

66. Divide \$125$\frac{1}{2}$ among A, B and C, giving C \$7$\frac{1}{4}$ more than B, and \$12$\frac{3}{4}$ more than A. ANS.: A, \$35$\frac{3}{4}$; B, \$41$\frac{1}{4}$; and C, \$48$\frac{1}{2}$.

67. What number is that which being increased by its $\frac{6}{7}$ and diminished by 20 is equal to 45? ANS.: 35.

68. I have in my mind two numbers; one is $3\frac{1}{2}$ times the other and their difference is 100. Find the numbers. ANS: 40 and 140.

69. What number is that to which if you add its $\frac{1}{8}$ and $\frac{1}{4}$ the sum will exceed its $\frac{1}{6}$ by 51? ANS.: 36.

70. A person bought a number of lemons for 94 cts.; having lost 7, he sold $\frac{1}{4}$ of the remainder at cost for 20 cts. How many had he at first? ANS.: 47.

71. $\frac{1}{3}+\frac{1}{4}+\frac{1}{6}$ of my money is \$18. How much money have I? ANS.: \$24.

72. The sum of two numbers is $9\frac{3}{8}$ and their difference is $4\frac{3}{8}$. 4 times the larger is how many times the smaller? ANS.: 11.

73. The owner of $\frac{3}{11}$ of a mine sold $\frac{9}{10}$ of his share for \$40,500. What should a person who owns $\frac{3}{5}$ of it get for $\frac{5}{7}$ of his share? ANS.: $\$70,714\frac{2}{7}$.

74. $\frac{2}{3}$ of A's money is to $\frac{4}{5}$ of B's as 3 to 4. They both together have \$1,520. How much has each? ANS.: A \$720 and B \$800.

75. A and B together have 153 sheep; $\frac{2}{3}$ of A's equals $\frac{3}{4}$ of B's. How many has each? ANS.: A, 81; B, 72.

76. A man in walking 18 miles finds that the distance he walks in 100 min. is $\frac{5}{7}$ of the remaining distance. Find his rate of walking. ANS.: One mile in $13\frac{1}{3}$ min.

77. A can do as much in 3 hrs. as B can do in 5. How long will it take A to finish a piece of work of which B has done $\frac{3}{4}$ in 20 hrs.? ANS.: 4 hrs.

78. If 20 men do a work in 12 days, how many men can perform another work three times as large in $\frac{1}{5}$ of the time? ANS.: 300.

79. A has $\frac{1}{2}$ of $1\frac{5}{7}$ times \$2,660, which is $2\frac{5}{7}$ times as much again as B has. How much has B? ANS.: \$420.

80. Divide 7,250 sheep between A and B so that A shall have $\frac{7}{8}$ as many as B, increased by 1,250. ANS.: A, 4,050; B, 3,200.

81. A had $\frac{4}{5}$ of $\frac{5}{6}$ of $7\frac{1}{2}$ times 7,862 sheep, and sold $\frac{1}{2}$ of $\frac{1}{3}$ of them. How many had he left? ANS.: 35,379.

82. There is a fish whose head is 12 inches long, and whose tail is as long as its head plus $\frac{1}{2}$ of its body, and whose body is as long as its head and tail. What is the length of the fish? ANS.: 96 in.

83. A man lost $\frac{2}{3}$ of all his money; he then found \$24; he now lost $\frac{2}{3}$ of all he had, and had only \$48 left. How much had he at first? ANS.: \$360.

84. B sold a cask of acid and water; $\frac{2}{3}$ of the whole plus 3 gallons is acid, and $\frac{1}{4}$ of the whole plus two gallons is water. How many gallons of each? ANS.: Acid, 43 gal.; water, 17 gal.

85. Find the result of $\frac{1}{2} + \frac{3}{4} \times \frac{2}{3} \div \frac{4}{5} - \frac{1}{8} \div \frac{1}{10} + \frac{6}{8} \times \frac{2}{6}$ ANS.: $\frac{1}{8}$.

86. A bought a lot for $68, which was $\frac{3}{7}$ of twice what he sold it for, lacking $1; how much did he gain? ANS.: $12.50.

87. Divide $542 between A and B so that $\frac{2}{3}$ of A's part plus 24 shall equal $\frac{3}{4}$ of B's. ANS.: A's, $270; B's, $272.

88. $\frac{3}{4}$ of A's age plus 8 yrs. equals $\frac{2}{3}$ of B's, and the sum of their ages is 148 years. Find their ages. ANS.: A's, 64; B's, 84.

89. What will 10 yds. of cloth cost at $1.0.$\overline{03}$ per yd.? ANS.: $10.10.

90. If $\frac{2}{3}$ of A's number of sheep plus $\frac{3}{4}$ of B's equals 180, and $\frac{3}{4}$ of B's number is to $\frac{2}{3}$ of A's number as $\frac{6}{7}$ to $\frac{3}{4}$, how many sheep has each? ANS.: A, 126; B, 128.

91. A, B and C have $645. C has twice as much as B, and if $12 be taken from A's he will have $\frac{1}{3}$ as much as B. How much has each? ANS.: A, $75.30; B, $189.90; C, $379.80.

92. A man owns a pig and a horse; $\frac{1}{4}$ the value of the horse equals four times the value of the pig. Both together are worth $170. Find the value of each. ANS.: Pig, $10; horse, $160.

93. If the $\frac{1}{3}$ of 6 is 3, what would the $\frac{1}{5}$ of 50 be? ANS.: 15.

94. What will 100 yds. of silk cost at $1.00.$\overline{02}{}^{2}_{4}$ per yd.? ANS.: $600.

95. A is 20 yrs. of age; B's age is equal to A's and $\frac{1}{2}$ of C's; and C's is equal to A's and B's together. Find the age of each. ANS.: B, 60 yrs.; C, 80 yrs.

96. A is 35 yrs. old and his son is 10. How soon will the son be $\frac{1}{2}$ the age of his father? ANS.: 15 yrs.

97. A and B can do a work in 20 hrs. If A does $\frac{3}{4}$ as much as B, in how many hours can each do it? ANS.: A, $46\frac{2}{3}$ hrs.; B, 35 hrs.

98. If to a certain number you add $\frac{1}{4}$ of itself the result will be 20 less than double the number. Find the number. ANS.: $26\frac{2}{3}$.

99. $\frac{1}{2}$ of A's sheep is equal to $\frac{3}{5}$ of B's, and the difference is 8. How many has each? ANS.: A, 48; B, 40.

100. James Boone sold $\frac{2}{11}$ of his sheep and then bought 65. He then had $\frac{3}{4}$ of all he had killed by dogs, and had left 10 less than he had at first. How many had he at first? ANS.: 33.

101. A man spent $\frac{2}{11}$ of all his money and then received $65, and then $\frac{3}{4}$ of what he first had equaled $\frac{99}{368}$ of all his money. How much had he at first? And what did he spend? ANS.: $33 at first; spent $6.

102. $\frac{3}{4}$ of $5\frac{1}{2}$ furlongs is $\frac{1}{2}$ of $\frac{1}{12}$ of how many miles? ANS.: $12\frac{3}{8}$.

103. A merchant gains a sum equal to $\frac{2}{3}$ of his capital; the $\frac{1}{2}$ of his gain multiplied by $\frac{1}{5}$ of his increased capital equals 4 times his gain. How much had he at first? ANS.: $24.

104. A and B have equal sums of money; A loses $\frac{1}{3}$ of his money and B gains $100; B then has three times as much as A. How much had each at first? ANS.: $100.

105. A hare has 100 yds. the start of a hound; the hare runs $7\frac{1}{2}$ yds. in $\frac{3}{4}$ of the time that the hound takes to run 12. How many yds. will the hound run to catch the hare? ANS.: 600.

106. A owns $\frac{3}{10}$ of a mine and B $\frac{5}{12}$. A bought from B enough to make his share equal to what B had left, paying therefor $3,500. What was the value of the mine? ANS.: $60,000.

107. Ten years ago the sum of the ages of two sons was $\frac{1}{3}$ of their father's age; one is two years older than the other and the present sum of their ages is 14 less than their father's age. How old are they? ANS.: 17 and 15 yrs.

108. A man earns twice as much as he had to begin with, and then spends $16; he loses $\frac{4}{5}$ of what remained, and afterwards earns as much as he had at first; he then had $80. What had he at first? ANS.: $52.

109. \$40 is divided among a number of men; if the number had been increased by $\frac{1}{4}$, each would have received 20 cts. less. Find the number of persons. ANS.: 40.

110. I spent \$15 more than $\frac{3}{8}$ of my money, and then had \$13 less than $\frac{3}{5}$ of it left. How much had I at first? ANS.: \$80.

111. A boy gives $\frac{2}{5}$ of his apples to A, $\frac{1}{3}$ to B and the rest to C. C gives 10 to B, and A then has 6 more than B. How many had each at first? ANS.: A, 96; B, 80; C, 64.

112. Four times B's age exceeds A's age by 20 yrs., and $\frac{1}{3}$ of A's age is less than B's age by 2 yrs. Find their ages. ANS.: A, 36 yrs.; B, 14 yrs.

113. $\frac{1}{11}$ of A's age is greater by two years than $\frac{1}{7}$ of B's, and twice B's age is equal to what A's age was 13 years ago. Find their ages. ANS.: A, 55; and B, 21 yrs.

114. $\frac{1}{3}$ of the sum of two numbers is 14, and $\frac{1}{2}$ of their difference is 4. What are the numbers? ANS.: 25 and 17.

115. $\frac{1}{9}$ of the difference between two numbers is 4, and $1\frac{1}{2}$ times their sum is 75. Find the numbers. ANS.: 7 and 43.

116. $\frac{1}{5}$ of the sum of two numbers is 16, and 4 times their sum and difference is 480. Find the numbers. ANS.: 60 and 20.

117. Bought 4 yds. of silk for \$.00.$\frac{4}{00}$ per yd. and sold it at \$1.$\frac{2}{00}$ per yd. Find my gain on the whole. ANS.: \$4.

118. A man walks to town at the rate of $4\frac{1}{2}$ miles an hour and walks back at the rate of 3 miles an hour. He was gone $7\frac{1}{2}$ hours. How far was it to town? ANS.: $13\frac{1}{2}$ miles.

119. $\frac{3}{4}$ of the difference between two numbers is equal to $\frac{1}{8}$ of their sum. The smaller number is 287. Find the larger. ANS.: 451.

120. B buys goods at a discount of $\frac{2}{5}$ and $\frac{1}{5}$ off and sells them at a discount of $\frac{1}{10}$ and $\frac{1}{20}$ off. What does he gain on the dollar? ANS.: \$$\frac{3}{8}$.

121. $\frac{2}{5}$ of a quantity of milk and water is milk. When I add 10 gal. of water the milk is $\frac{7}{20}$ of the whole. What was the mixture at first? ANS.: 70 gal.

122. Divide $12\frac{1}{2}$ into two parts so that one shall be $12\frac{1}{2}$ times the other. ANS.: $\frac{2}{27}$ and $11\frac{23}{54}$.

123. I bought a watch and chain for \$48. $\frac{1}{5}$ the cost of the watch plus the difference between the watch and chain equals the chain. Find the cost of each. ANS.: Chain, \$18; watch, \$30.

124. I buy calico and sell it at a profit of $\frac{1}{8}$ of the cost. Find the cost per yard if the selling price of 125 yds. is equal to the profit on \$30 outlay. ANS.: 6 cts.

125. If $\frac{2}{3}$ of \$1 buy $\frac{1}{5}$ of a sheep and $\frac{3}{7}$ of a sheep be worth $\frac{1}{14}$ of an ox, what will 10 oxen cost? ANS.: \$200.

126. A is 20 yrs. old; the sum of the ages of B and C equals 4 times A's age. C's age is $\frac{1}{9}$ of A and B together. What is the age of each? ANS.: C, 10; B, 70 yrs.

127. If $\frac{1}{4}$ of 8 is 3, what would the half of 90 be? ANS.: $67\frac{1}{2}$.

PERCENTAGE.

1. A man sold a horse for \$84, and by so doing gained $\frac{1}{5}$ of what it cost him. What % would he have gained if he had sold it for \$100? ANS.: $42\frac{6}{7}\%$.

2. A sold $\frac{3}{4}$ of a lot for \$72 and gained \$6. What would have been his rate of gain had he sold the whole lot for \$100? ANS.: $13\frac{7}{10}\%$.

3. A sells pork at \$10 a bbl., $\frac{1}{5}$ of which equaled his gain. How many % would he have gained if he had sold it at \$12 a barrel? ANS.: 50%.

4. Sold a horse for \$440 and thereby gained 10%. How ought I to have sold it to lose 25%? ANS.: \$300.

5. A and B invest equal sums in business. A gains a sum equal to 25% of his stock. B lost \$225. A's money at that time is twice B's. What did each invest? ANS.: \$600.

6. I sold two lots for $300 each. On one I gained 25%; on the other I lost 25%. How much did I lose? What per cent.? ANS.: $40 loss; $6\frac{1}{4}\%$.

7. I sold goods at a gain of 20%. If they had cost me $250 more I would have lost 20% by the sale. What did the goods cost? ANS.: $500.

8. I sold two lots for $597, gaining by the sale 25% on the first and 10% on the cost of the second. If $\frac{3}{4}$ of the cost of the first equals $\frac{2}{3}$ of the cost of the second, what was the cost of each? ANS.: 1st, $270; 2d, $240.

9. If I sell $\frac{3}{4}$ of an article for what $\frac{7}{8}$ of it cost, what is my gain %? ANS.: $16\frac{2}{3}\%$.

10. I sell goods so that $\frac{5}{7}$ of the cost is received for $\frac{1}{2}$ of the quantity of goods. Find gain %. ANS.: $42\frac{6}{7}$.

11. A man pays $600 for rent; $\frac{3}{4}$ of this sum is $33\frac{1}{3}\%$ of $\frac{1}{2}$ his income. What is his income? ANS.: $2,700.

12. A man owning $33\frac{1}{3}\%$ of a farm sold 25% of his share for $3350.50. What was the whole farm worth? ANS.: $40,206.

13. $\frac{1}{4}$ of $\frac{1}{3}$ of 60 is 75% of $33\frac{1}{3}\%$ of what number? ANS.: 20.

14. $66\frac{2}{3}\%$ of $\frac{2}{5}$ of 100 is 5% of 10 times 25% of what number? ANS: $213\frac{1}{3}$.

15. A man paid me $80, which was $8\frac{1}{2}\%$ of $\frac{1}{2}$ the amount he still owed me. How much does he still owe? ANS.: $\$1,882\frac{6}{17}$.

16. A farm cost $3,000. $\frac{1}{3}$ of this sum was $62\frac{1}{2}\%$ of what the house and barn cost. Find cost of house and barn. ANS.: $1,600.

17. What is that number to which, if $37\frac{1}{2}\%$ of $\frac{1}{4}$ of 20% of 480 be added, the sum will equal $\frac{1}{4}$ of $\frac{8}{9}$ of 50% of 324? ANS.: 27.

18. By selling a cow for $21 I lost $12\frac{1}{2}\%$. At what price should I have sold her to have gained $12\frac{1}{2}\%$? ANS.: $27.

19. In building a house I paid 3 times as much for material as for labor. Had I paid 5% less for material and 4% more for labor the house would have cost $2,334. What did it cost me? ANS.: $2,400.

20. In a building I paid three times as much for material as I did for labor. Had I paid 5% less for material and 4% more for labor it would have cost me $66 less. What did I pay for the labor and material? ANS.: $600 and $1,800.

21. I sold a carriage to B and gained 7½%. B sold it to C for $141.90 and lost 12%. What did it cost me? ANS.: $150.

22. A hog was sold for 75% of its cost, but had it cost me $1 00 more it would have sold for 60% of its cost. Find its cost. ANS.: $4.00.

23. On a bill of $425, what is the difference between 50% off and 30 and 20% off? ANS.: $25.50.

24. A buys a $60 sewing machine at a discount of 30 and 16⅔% off and sells it at 5% above the list. How much does he make? ANS.: $28.

25. I bought goods amounting to $725.16 at ⅓ and 5 off. What did I pay for them? ANS.: $459.27.

26. ⅔ of what I received for an article is equal to ¾ of its cost. What is the gain %? ANS.: 12½%.

27. I marked goods to gain 60%, but on account of an incorrect measure I gained only 40%. What was the length of the measure? ANS.: 41⅐ in.

28. An article is marked to gain 40%, but I throw off 10% and afterwards pay 20% for collecting the debt. What is my gain or loss? ANS.: ⅘% gain.

29. I buy vinegar at 40 cts. per gallon. I then add water so that by selling the mixture at 30 cts. per gallon I make 50%. What % of each gallon is water? ANS.: 50%.

30. If I buy for 20% less I will make 30% more. What is my gain %? ANS.: 20%.

31. If ⅘ of the selling price is 20% less than the cost, what is the gain or loss? ANS.: 6⅔% gain.

32. 66⅔% of 240 is 11⅓% less than 20% of what number? ANS.: 900.

33. If ⅘ of the selling price equals ⅔ of the cost price, find the % gain or loss. ANS.: 20% loss.

34. Two houses sold for $300 each. On one I gained 20% and lost 25% on the other. What did I gain or lose? ANS.: $50 loss.

35. I bought a watch for $30, which was 40% less than its value, and sold it for 50% more than its value. Find my gain. ANS.: $45.

36. I sold a horse at a gain of 20%. With the money I bought another and sold it for $60 and lost 37½%. Find my gain or loss. ANS.: $16 loss.

37. If an article had cost me 8% less my gain would have been 15% more. Find my rate of gain. ANS.: 72½%.

38. I bought corn at 50 cents a bu.; 5% wasted. At what price must I sell it to gain 33⅓%? ANS.: 70$\frac{10}{57}$c.

39. What % of .005 is $100? ANS.: 2,000,000%.

40. If an article had cost me 10% more my rate of gain would have been 20% less. What is my rate of gain? ANS.: 120%.

41. If ⅔ of what I receive for a horse is equal to ¾ of its cost, find rate of gain. ANS.: 12½%.

42. If cost had been 20% less, loss would have been 15% less. What was the loss %? ANS.: 10%.

43. If goods cost $180, how should I mark them so that I may fall 10% and still make 20%. ANS.: $240.

44. A, B and C are partners. A receives 35% of the profits. Of the remainder B's share is 60% more than C's. C's income is increased by $150, when the profits rise from 10% to 12%. What did each invest? ANS.: A, $10,500; B, $12,000; and C, $7,500.

45. I bought a number of lbs. of tea for $12. If I had bought 10 lbs. more, I would have been allowed a discount of 10% on the whole and the price would have been $18. How many lbs. did I buy at first? ANS.: 15 lbs.

46. I lost 25% on the purchase. What % must I gain on the remainder to gain 25% on the whole? ANS.: 66⅔%.

47. What must I ask for a hat that cost $4 so that I can fall 20% and still make 20% on the cost? ANS.: $6.00.

48. A and B have $12,550; A's money is 125% of B's plus $400. How much has each? ANS.: A, $7,150; B, $5,400.

49. A farmer sold two horses for $810, receiving $\frac{4}{5}$ as much for the first as for the second. On the first he gained $33\frac{1}{3}\%$, and on the second he lost $11\frac{1}{9}\%$. What did he gain? ANS.: $33.75.

50. I bought 5 chests of tea of 74 lbs. each at 45 cts. per pound at 2% off for cash. What will be my profit if I retail it at $12\frac{1}{3}\%$ advance? ANS.: $20.12.

51. If my horse had cost 25% less than 80% of what he did cost, I would have received $66\frac{2}{3}\%$ more than I did. What % did I gain or lose? ANS.: $18\frac{1}{27}\%$ gain.

52. I sold two horses for the same sum; on one I gained 25%; on the other I lost 25%. I lost $30. Find the cost of each? ANS.: $180, first; $300, second.

53. I bought 150 pounds of sugar at 6 cts.; after selling 100 lbs. at a loss of 5%, at how much a pound must I sell the remainder in order to gain 10% on my investment? ANS.: $8\frac{2}{3}$ cts.

54. I sold my goods for $1,125; $\frac{1}{2}$ is sold for 25% gain, $\frac{2}{5}$ at $12\frac{1}{2}$% gain, and the remainder at $\frac{1}{2}$ of the cost. What did I pay for the goods? ANS.: $1,000.

55. What is the difference between 15% and 5% off, and 5% and 15% off? ANS.: 0.

56. I bought an invoice of goods which at retail sells for $850 at 30% off and $2\frac{1}{2}\%$ off for cash. What did they cost? ANS.: 580.12\frac{1}{2}$.

57. The sum of two numbers is 4655, and 40% of one is equal to 60% of the other. What are the numbers? ANS.: 1862 and 2793.

58. A teacher spent 24% of his money and had $760. What is his income? ANS.: $1,000.

59. What must I ask for a hat that cost $1.60 so that I may reduce my asking price 30% and lose $12\frac{1}{2}\%$? ANS.: $2.00.

60. I bought a wagon for $72, and sold it for 25% more than it cost and 10% less than I asked. What was my asking price? ANS.: $100.

61. $1\frac{1}{2}\%$ of my money is $12\frac{1}{2}\%$ more than $480. How much have I? ANS.: $36,000.

62. A sold B a horse for \$120. If B had paid 10% less A would have lost 8%. What did the horse cost A? ANS.: \$117$\frac{9}{23}$.

63. I sold two horses for \$105 each; on one I gained 25% and on the other I lost 25%. Did I gain or lose? How much? ANS.: \$14 loss.

64. I pay \$600 a year for rent; 75% of this is just 33$\frac{1}{3}$% of $\frac{1}{2}$ of my income. What is my income? ANS.: \$2,700.

65. I own $\frac{1}{3}$ of a vessel and sell 25% of it for \$350; at that rate what is the whole vessel worth? ANS.: \$4,200.

66. I bought tea for 20% less than its marked value and got 5% off for cash. I sold it for 15% above the marked value. Find % gain. ANS.: 51$\frac{6}{19}$%.

67. A merchant asked 25% more for his goods than they cost him, but sold them at 10% less than his asking price, realizing \$4684 profit. What was the cost of the goods? ANS.: \$37,472.

68. I sold goods at a gain of 20%. If they had cost me \$60 less I would have gained 25%. Find cost of goods. ANS.: \$1,500.

69. I sold two houses for the same price; on one I gained 25% and on the other I lost 25%. I lost \$60. Find the cost of each house. ANS.: \$360 and \$600.

70. Sold a horse at a gain of 33$\frac{1}{3}$% and with the money bought another and sold it for \$120 and lost 25%. What was my gain or loss %? ANS.: 0%.

71. Bought for 20% off and sold them for 20% above list price. I gained \$90. Find the cost. ANS.: \$225.

72. I buy goods for \$1200 and sell $\frac{1}{2}$ at a profit of 15%. I then raise the price from 15 to 17$\frac{1}{2}$ cts. per yd., and sell the remainder. Find my profit. ANS.: \$190.

73. I gained 30% on $\frac{3}{5}$ of my investment and lost 5% on the remainder. My profits were \$720. What did I invest? ANS.: \$4,500.

74. I sold goods and gained 30% on $\frac{2}{5}$ and lost 5% on $\frac{3}{5}$. I had invested \$4500. Find my gain. ANS.: \$405.

75. I bought a horse for $240. What must I ask for it that I may deduct 25% from my asking price and still make 25%? ANS.: $400.

76. I bought rice, tea, coffee and sugar. The tea cost 60% more than the rice; coffee 50% more than the tea; sugar 25% more than the coffee. The whole cost was $240. Find the cost of each. ANS.: rice, $30; tea, $48; coffee, $72; sugar, $90.

77. I sold ½ of my goods at 20% gain, and the remainder at a loss of 10%; my gain was $100. What was the cost of the goods? ANS.: $2,000.

78. A farmer sold 38% of his land, and afterwards bought 25% of as much as he had left. He then had 9 acres less than at first. What had he at first? ANS.: 40 acres.

79. I bought 300 yds. of cloth. Sold ½ at 20% gain, and the remainder at a loss of 12½%. My whole gain was $30. What was the cost of the cloth per yard? ANS.: $2⅔.

80. I sold two city lots for $1200; gained 20% on one and lost 20% on the other. I lost $50. What did each cost me? ANS.: $500 and $750.

81. I bought sugar at 8 cts. a lb.; the wastage is 10%. How must I sell it to gain 30%? ANS.: 11⅔ cts. a lb.

82. I bought a barrel of wine containing 46 gal. at $2.50 per gallon; if 6 gallons leak out, how must I sell the remainder to gain 25%? ANS.: $3.59⅜ per gal.

83. Silver is $\frac{9}{10}$ pure. What % would it take to make it $\frac{11}{12}$ pure? ANS.: 1⅔%.

84. Silver is $\frac{11}{12}$ pure. How pure would it be if you would add 2⅞%? ANS.: $\frac{17}{18}$ pure.

85. The cost of publishing a book is 50 cts. a copy; if the expense of sale be 10% of this, and the profit 25%, what does it sell for? ANS.: 67½ cts.

86. My retail gain is 33⅓%, and I sell at wholesale for 10% less than at retail. What is my gain % at wholesale? ANS.: 20%.

87. Bought dishes; lost 15% by breakage; at what % above cost must I sell the remainder to clear 20% on the whole? ANS.: 41$\frac{3}{17}$.

88. If I pay for a lb. of sugar, and get a lb. troy, what % do I lose? ANS.: 25%.

89. Sold my lot at 40% gain; with the proceeds bought another and sold it for $238, losing 20%. What did each lot cost me? ANS.: 1st, $212 50; 2d, $297.50.

90. I spent 50% of my money the first day; the second, 50% of the remainder, and so on for 10 days, when I had left only $1.00. What had I at first? ANS.: $1,024.

91. I made this year $2400, which is 120% of my gain last, and that is $44\frac{4}{9}$% of my gain the year before. What were my gains the two previous years? ANS.: last year, $2,000; year before, $4,500.

92. I bought goods by dry measure and sold at cost by wine measure; I bought another lot of same by wine measure and sold at cost by dry measure. Required the rate of gain or loss. ANS.: $2\frac{53}{175}$% gain.

93. Bought wheat, and 6% was wasted; 30% moulded, which I sold at 40% less than the same amount cost; at what % advance on the first cost must the good wheat be sold so as to yield a profit of 14% on the investment? ANS.: 50%.

94. A's money is 3% of B's and 4% of C's; B has $100 more than C. How much has A? ANS.: $12.

95. If 25% of what I receive for an article is gain, what is my rate of gain? ANS.: $33\frac{1}{3}$%.

96. I sell at 8% gain; I invest and sell again for $12\frac{1}{2}$% gain; invest again and sell at a loss of 4%, and have $1,166.40. What had I at first? ANS.: $1,000.

97. Henry spent $18\frac{2}{11}$% of his money, and then received $65; he then lost 75% of all his money, and had $10 less than he had at first. What had he at first? ANS.: $33.

98. 75% of the difference between two numbers is equal to $16\frac{2}{3}$% of their sum. The smaller number is 287. Find the larger. ANS.: 451.

99. I bought a certain number of hats at $2.50 each; I sold $\frac{2}{5}$ of them at 25% profit, and on the sale of the remainder I lost $15. My total loss was equal to 5%. Find the number of hats. ANS.: 120.

100. A merchant bought 100 yds. of cloth at 10 francs per yard. 10% was lost by damage, and he sold the remainder at 10 marks per yard. Find the rate of gain or loss. ANS.: $9\frac{23}{193}\%$ gain.

101. A has 50% more money than B. B's money is what % of A's? ANS.: $66\frac{2}{3}$.

102. Sold a horse at a profit of 40% on the cost, and at a discount of $12\frac{1}{2}\%$ from the asking price. What was my asking price if cost was \$100? ANS.: \$160.

103. 10% of $\frac{2}{5}$ of anything is what % of $\frac{4}{7}$ of it? ANS.: 7%.

104. I bought cloth and marked it at an advance of 40%. In selling, I used a yard-stick one inch too short. My total gain was \$330. Find cost of cloth. ANS.: \$770.

105. A buys an article and sells it to gain $12\frac{1}{2}\%$. If he had bought it for 10% less and sold it for \$18 less he would have gained \$20. Find the cost. ANS.: $\$168\frac{8}{9}$.

106. I sold a piece of cloth for \$24, losing 25%. If I had sold it for \$34, would I have gained or lost, and what %? ANS.: $6\frac{1}{4}\%$ gain.

107. A and B invested equal sums in business. A gains a sum equal to 25% of his stock and B lost \$225, when A's money at this time was double that of B's. What amount did each invest? ANS.: \$600.

108. 10% of 120 is 8 less than 5% of what No.? ANS.: 400.

109. Sold a wagon for \$25, losing $16\frac{2}{3}\%$; bought another and sold it at a gain of 16%. I neither gained nor lost on the two. What did each cost? ANS.: 1st, \$30; 2d, \$31.25.

110. By selling for \$5 less than cost I lose $\frac{1}{8}\%$. Had I sold it for \$6 more than I did what % would I have gained? ANS.: $\frac{1}{40}\%$.

111. I marked goods to gain 60%, but on account of using an incorrect yard-stick I only gained 40%. What was the length of the measure? ANS.: $1\frac{1}{7}$ yd.

112. I buy vinegar at \$4 a bl. and add water so that when I sell it at \$3 a bl. I make 50%. What % of the mixture is water? ANS.: 50%.

113. I sold goods at a certain gain %. If they had cost me 50% less my gain would have been 6 times as great. What % did I gain? ANS.: 10%.

114. I spent equal sums for rice, coffee and tea. I gained 20% on the rice, 10% on the coffee, and lost 8% on the tea. My total receipts were $3,864. Find the cost of each. ANS.: $1,200.

INTEREST.

1. I gave my note, 10 per cent. from date, for $2,442.04. What sum, paid annually, will have discharged the whole at the end of 5 years? ANS.: $644.204.

2. If the true annual rate of interest be 10%, what would be the true rate for each 73 days, if the interest be compounded throughout the year? ANS.: 1.924 per cent.

3. I get 24 cents per day, which is $\frac{2}{3}$ of a mill per day on $1. How much have I at interest? ANS.: $1,080.

4. I pay 6% int. payable semi-annually, and lend it at 12%, payable quarterly. I clear $2,450.85 a year. What is the sum? ANS.: $38,485.87.

5. A debt is to be paid in 4 equal installments at 4, 9, 12, 20 months, respectively; its cash value is $750, allowing 5% simple interest. What is the debt? ANS.: $785.156.

6. I bought a lot for $156 due in 8 months, and sold it at once for $180. What is my gain %, int. 4½% ? ANS.: $18\frac{11}{13}$%.

7. I sell my farm for $4,850; $250 payable at 6 mon., 1½ yr., 2½ yr., 3½ yr., and 4½ yr. each, and the balance in 5 yrs.; if money is worth 10% per annum to me, what is the cash value of the sale? ANS.: $3,413.08+.

8. What must I loan Jan. 1st, at 9%, to be repaid by 5 installments of $200 each, payable on the first day of the 5 succeeding months? ANS.: $978.15.

9. I owe $1500, due in 1 yr. 10 mo. I pay $300 cash, and a note for 6 mo. for the balance; what is the face of the note, interest 6%? ANS.: $1,080.56.

10. What rate do I make by charging 12% per annum, compound interest, payable quarterly? ANS.: $12\frac{550881}{1000000}$.

11. What is my gain in 1 yr., on $100 deposited at 6% and loaned 11 times for 33 days. Int. 2% a mon.? ANS.: $18.20.

12. Principal, $3,325, time 10 mo. 24 days. Int. $119.70; find the rate. ANS.: 4%.

13. At what rate per annum will any sum double by simple interest in 6 years? ANS.: $16\frac{2}{3}$%.

14. At what per cent. will $6,000 produce $45 in one month? ANS.: 9%.

15. What principal will produce $17 interest in 68 da. at 1% a month? ANS.: $750.

16. At what rate per annum will any sum treble itself at simple interest in 30 yrs.? ANS.: $6\frac{2}{3}$%.

17. What is the rate of interest when stock bought at 40% discount yields a semi-annual dividend of 5%? ANS.: $16\frac{2}{3}$%.

18. At what rate per annum will any sum quadruple itself at simple int., in 24 yrs.? ANS.: $12\frac{1}{2}$%.

19. What sum, drawing simple int. at 5% per annum, will amount to $819.45 in 1 yr. 8 mo. 5 da.? ANS.: $755.93.

20. In what time will $100 double itself by simple interest at 8%? ANS.: $12\frac{1}{2}$ yrs.

21. The interest on twice A's and 3 times B's money for 5 yrs. 6 mo. at 6% is $2,640; how much has each if twice A's equals 3 times B's? ANS.: A, $2,400; B, $1,600.

22. How long must I deposit $1,374.50, at 10%, to pay a debt of $1,480.78? ANS.: 9 mo. 8—da.

23. How long would it take $175.12 to produce $6.43, interest 6%? ANS.: 7 mo. 10 da.

24. How long will it take $3,642.08 to amount to $4,007.54 at 12%? ANS.: 10 mo. 1 da.

25. What is the rate of discount when a 60-day note yields 2% interest a month? ANS.: $23\frac{17}{21}\%$.

26. Find the face of a 90-day note, to net $1,000 when discounted at 6%. ANS.: $1,015.74.

27. At what rate should I discount a 60-day note to get 20% per annum interest? ANS.: $19\frac{67}{207}\%$.

28. What is the rate when the interest on $200 for 2 years is $48? ANS.: 12%.

29. How much must I loan at 6% to produce $48 in 2 yrs.? ANS.: $400.

30. I invest $\frac{1}{5}$ of my annual income in mortgages paying 6% annual interest. In 6 mo. 12 days my interest from them was $640. What is my annual income? ANS.: $100,000.

31. Find the difference between the annual and compound interest of $400 for 2 yrs. at 8%. ANS.: 0.

32. Find the difference between the annual and compound interest of $200 for 3 yrs. at 6%. ANS.: $.04+.

33. Find the difference between the simple and compound interest of $200 for 2 yrs. at 8%. ANS.: $1 28

34. What must I save annually commencing at 18, so that I may have $25,000 when I am 37 yrs. of age if I get 6% compound interest? ANS.: $698.74+.

35. If the interest on the sum of A's and B's money, for 3 yrs. 9 mo., at 8%, is $3,213, and $\frac{2}{3}$ of A's money is equal to $\frac{3}{4}$ of B's, how much has each? ANS.: A, $5,680; B, $5,040.

36. $\frac{3}{5}$ of the cost of A's house, increased by $\frac{4}{5}$ of the cost of his farm for 2 yrs. at 5% amounts to $4,950. What was the cost of each if $\frac{3}{5}$ of the cost of the house was only $\frac{2}{7}$ as much as $\frac{4}{5}$ of the cost of the farm? ANS.: House, $1,666.66$\frac{2}{3}$; farm, $4,375.

37. The sum of $\frac{2}{3}$ of A's plus $\frac{1}{2}$ of B's money being on interest for 8 yrs. at 6% gives $960 interest. What has each if $\frac{1}{2}$ of B's is 3 times $\frac{2}{3}$ of A's? ANS.: A's, $750; B's, $3,000.

38. A's money added to $\frac{2}{3}$ of B's, which is to A's as 2 to 3, being put on interest for 6 yrs, at 4%, amounts to $744. What has each? ANS.: A, $360; B, $360.

39. In what time will \$13 at 6% give \$0.975 interest? ANS.: 1 yr. 3 mo.

40. The interest of \$325 for 2 mo. is \$3.25. Find the rate. ANS.: 6%.

41. By lending a sum of money at 4% and another sum at 5% the total interest is \$68. If the rates are changed the interest is \$67. Find the principal lent at each rate. ANS.: \$700 and \$800.

42. The interest on my money for 9 mo. at 5% is \$150 less than the same for 15 months at 4%. Find the sum. ANS.: \$12,000.

43. A sum of money doubled itself in 16 yrs. at simple interest. Find the rate. ANS.: $6\frac{1}{4}\%$.

44. The amount of a certain sum at simple interest for 3 yrs. is \$558; for $4\frac{1}{2}$ yrs. it amounts to \$612. Find the rate and principal. ANS.: Rate, 8%; prin., \$450.

45. The interest is $\frac{2}{5}$ of the principal, and the difference between the interest and principal is \$120. Find the interest. ANS.: \$80.

46. The interest is $\frac{1}{5}$ of the principal. The difference between the interest and principal is \$120. Find the principal. ANS.: \$150.

47. The interest on a sum of money in 5 yrs. is $\frac{5}{8}$ of the sum. What is the rate? ANS.: $12\frac{1}{2}\%$.

48. At $3\frac{1}{2}\%$ for 8 yrs. what fraction of the principal is $\frac{1}{7}$ of the interest. ANS.: $\frac{1}{2\frac{4}{5}}$.

49. The interest of a sum of money at the end of 15 yrs. was $\frac{3}{5}$ of the sum itself. What was the rate? ANS.: 4%.

50. A sum of money in 9 yrs. at 11% at simple interest amounts to \$597. In how many years will it amount to \$663? ANS.: 11 years.

51. The interest of \$1,460 for one day is 25 cents. Find the rate % per annum (365 da.) ANS.: $6\frac{1}{4}\%$.

52. In what time at simple interest will \$723.16$\frac{1}{2}$ return $\frac{5}{8}$ of itself at $7\frac{1}{2}\%$? ANS.: 8 yrs. 4 mo.

53. A certain sum in 8 months amounts to \$790, and in 19 months to \$845. What is the rate? ANS.: 8%.

54. What is the difference between the simple interest of $139 for 600 days and $600 for 139 days? ANS.: 0.

55. The interest of a certain sum is $\frac{1}{7}$ of the principal. The amount is $640. Find the principal. ANS.: $560.

56. At what rate simple interest will a sum become 4 times itself in 20 yrs.? ANS.: 15%.

STOCKS AND BONDS.

1 What do I receive for 32 shares of telegraph stock which a broker sells for me at 15% discount, charging $\frac{1}{4}$% brokerage? ANS.: $2,712.

2 I purchased 18 shares of telegraph stock for $500 per share at a premium of 2% and sold them for 28% below par. What was my loss? ANS.: $2,700.

3 How many shares of stock must be sold at 4% discount, brokerage $\frac{1}{2}$%, to realize $4,775? ANS.: 50.

4 I received a 6% dividend on certain stock and invested the money in the same stock at 75%. My stock had then increased to $16,200. What was the amount of my dividend? ANS.: $900.

5. If I buy 6% stock at 90%, what rate of interest do I receive on my investment? ANS.: $6\frac{2}{3}$%.

6. At what rate must an 8% stock be purchased to yield the purchaser 7% interest? ANS.: $114\frac{2}{7}$.

7. At what price must 6% stock be purchased in order to obtain 8% income on the investment? ANS: 75%.

8. What sum must be invested in 8% stock at 130 to produce an income of $2,000? ANS.: $32,500.

9. Bought 120 shares of canal stocks, $10 each, at $1\frac{1}{4}$% advance and sold at $\frac{3}{8}$% discount. Find my loss. ANS.: $23.

10. At what discount must I buy stocks so that by selling at 2% premium I may gain 20% on my investment? ANS.: 15%.

11. If I receive an annual dividend of 6% on Michigan stock, which cost me but 37½%, what % income do I receive on my investment? ANS.: 16%.

12. I bought bonds at 4% discount and sold them at 5% premium. I gained $450. How many shares of $50 each did I buy? ANS.: 100.

13. When N. Y. Central is quoted at 98⅛, how much stock can be bought for $6,894, brok. ⅛%? ANS.: $7,200.

14. I buy stocks at 25% below par and sell 20% above par. What % do I make? ANS.: 60%.

15. If I buy stock at 30% discount and every 6 months receive a dividend of 4%, what is my annual rate of interest? ANS.: 11⅜%.

16. A person exchanged 250 shares of 6% bonds at 70, for bonds bearing 8% at 120. What is the difference in his income? ANS.: $333⅓.

17. How many shares of stock $100 each must be sold at 4% discount, brok. ½%, to realize $4,775. ANS.: 50.

18. My broker sells 50 shares of stock, brok. ½%. He remits me $2,348.20. At what rate did the stock sell? ANS.: 47⅕%.

19. At what price must I purchase 15% stock that it may yield the same income as 6% stock purchased at 90. ANS.: 225.

20. If stock bought at 15% premium pays 8% on the investment, what % would it pay if bought at 10% discount? ANS.: 10⅔%.

21. What should I pay for a 6% bond of $50 that I may realize 8%? ANS.: $37.50.

22. When gold is at 115 and U. S. 10–40's at 105, what is a $500 bond worth? ANS.: $456.52 4/23.

23. A party investing in 5% bonds realizes 8% income on his investment. How did the bonds stand? ANS.: 62½.

24. How much must be invested in U. S. 8's at 95 to receive an annual income of $3,000? ANS.: $35,625.

25. What % on his investment will a person receive who buys U. S. 6's at 107 when gold stands at 150? ANS.: $8\frac{44}{107}\%$.

26. When gold is worth 129 what yearly % income will a person receive who invests $7,540 in U. S. 6's when selling at 104? ANS.: $7\frac{23}{52}\%$.

27. What must gold sell for that a party investing in 5–40's at 105 may realize 8% on his investment? ANS.: 140.

28. When gold is at 115 what is the semi-annual interest in currency on $9,500 in 10–40's? ANS.: $273.125.

29. When gold is at 115 what amount in currency can be bought for $8,500 in gold? ANS.: $9,775.

30. A broker invested $21,300 in 5–20's at $106\frac{1}{2}$ and sold them at 109. How much did he gain? ANS.: $500.

31. When gold is 105 what is the value in gold of a dollar in currency? ANS.: $95\frac{5}{21}$ cents.

32. Bought $800 in gold at 110, brok. $\frac{1}{8}\%$. What did I pay for gold in currency? ANS.: $881.

33. What face value of stock paying $1\frac{5}{8}\%$ quarterly dividend will yield an annual income of $513.50? ANS.: $7900.

34. What must be invested in $6\frac{1}{2}\%$ bonds bought at 105 to realize an income of $1,000? ANS.: $16,153.84\frac{8}{13}$.

35. At the end of 6 mos. I received 4% dividend in stock; at the end of the year, a 5% dividend in stock. I then had $12,012 worth of stock. How many shares had I at first? ANS.: 110.

36. When U. S. 4's are worth 106, what will be my yearly income in gold from bonds that cost $4,982? ANS.: $188.

37. If I pay 70 for bonds that yield an annual income of 7%, what % do I get on my investment? ANS.: 10%.

38. How many shares of railroad stock bought at $95\frac{1}{4}$ and sold at 105, brokerage $\frac{1}{4}\%$ on each transaction, will yield an annual income of $925? ANS.: 100.

39. What must I invest in U. S. 5's at 118 to yield an annual income of $1,921 in currency when gold is worth 113? ANS: $40,120.

40. I own 25 shares in an electric light plant which declares a 5% annual dividend. I take the dividend in lighting at the rate of $2.50 per lamp. How many lamps can I burn 10 mos. of each year? ANS.: 60.

41. What will be the cost of 25 $1,000 5-20 U. S. bonds of 1865 at 114¼, brokerage ⅛%? ANS.: $28,593.75.

42. My broker sells a certain amount of stocks and remits me $25,734.37½. His brokerage at $\frac{1}{16}$% was $15.62½. What was the price of the stocks? ANS.: 103.

43. What is my currency income if I invest $5,220 in U. S. 5-20 6% bonds at 116 when gold is 105? ANS.: $283.50.

44. Find the cost of 125 shares U. P. R. R. stock at 68½, brokerage ¼%? ANS.: $8,593.75.

45. What will $8,000 U. S. 10-40's of '65 cost at 108¼, brok. ⅛%? ANS.: $8,670.

46. How much will 55 shares of railroad stock cost at 28¾, brok. $13.75? ANS.: $1,595.

47. If I pay $5,418.75 for 50 U. S. 5-20's at 8¼% premium, what is the rate of brokerage? ANS.: ⅛%.

48. Bought 35 shares of canal stock at 86½ and sold them at 8¼% premium. Find my gain. ANS.: $761.25.

49. I sold 135 shares of stock at a discount of 15¼%, paying ¼% brokerage. How much did I receive for it? ANS.: $11,407.50.

50. How many shares of bank stock at 5% discount can be purchased for $3,790 if ¼% is paid for brokerage? ANS.: 40.

51. What will be my income if I invest $4,196.25 in 5% stock purchased at 93, allowing ¼% for brokerage? ANS.: $225.

52. What will be my annual income if I invest $1,299 in 6% stock purchased at 37%, allowing ¼% brokerage. ANS.: $209.23+.

53. If I receive $622.80 by investing $4,696.95 in bonds at 45%, brokerage ¼%, what rate do the bonds bear? ANS.: 6%.

54. Which is more profitable, and how much, to invest $5,000 in 6% stock purchased at 75, or 5% stock purchased at 60%? ANS.: 5% at 60 by $16.66⅔.

55. U. S. 5-20's pay 6% interest in gold. What will be my income in currency by investing $11,212.50 at 112⅛ when gold is at 106⅞? ANS.: $641.25.

56. Which is more profitable, to buy 6% bonds at 90, interest payable in currency, or 5% bonds at 95, interest payable in gold, when gold is at 106⅜? ANS.: 6% at 90.

57. Which affords the greater % of income, bonds bought at 125 which pay 8%, or bonds which pay 6% bought at a discount of 10%? ANS.: 6% at 10% discount.

58. Which is more profitable, and how many %, to buy New York 7's at 105, or Louisiana 6's at 98? ANS.: N. Y. 7's $\frac{80}{147}$%.

59. What must I pay for stock which pays a dividend of 15% so that I may realize 7% on my investment? ANS.: 214⅔.

60. I bought stock at 225 which yielded the same income as 6% stock bought at 90%. What rate did my purchase bear? ANS.: 15%.

61. I sold $5,000 of U. S. 6's of '81 at 115 and invest in 10-40's at 105. Do I gain or lose and how much annually (latter bearing 5%)? ANS.: $26.20 loss.

62. What is a dollar in currency worth when gold is quoted at 125? ANS.: 80 cents.

63. If stock bought at 105 pays 6% on the investment, what will it pay if bought at 15% discount? ANS.: $7\frac{7}{17}$%.

64. What must be the price of gold so that a person investing in 5-20's at 108 may realize 7%? ANS.: 126.

65. If I invest a certain sum in 6's at 85 and the same in 7's at 95 and receive $5 more a year from the latter investment, how much do I invest in each? ANS.: $1,615.

66. What sum must I invest in U. S. 5-20's of '82 at 96¾%, brokerage ¼%, to secure an annual income of $1,500? ANS.: $24,250.

67. If I invest $10,200 in U. S. 6's at 30%, what is my income? ANS.: $2,040.

68. If I pay 125 for 10% bonds, what % do I make? ANS.: 8%.

69. When gold is 50% premium over paper money, what is a paper dollar worth? ANS.: 66⅔ cents.

70. At what price will a $7\frac{3}{10}\%$ government bond of $1,000 pay the purchaser 6% interest? ANS.: $121\frac{2}{3}$.

71. At what price will a 10% bond of $50 pay 9% interest? ANS.: $\$55\frac{5}{9}$.

72. If gold were worth 125 and U. S. 5–20's worth 105, what size of bond could I buy for $420 in gold? ANS.: $500.

73. I pay $150 for two 6% bonds of $100 each. What rate do I realize on the investment? ANS.: 8%.

74. I pay through a broker $29,840 for 6% Cleveland Water Works bonds at $93\frac{1}{4}\%$, including brokerage. The owner afterwards refunds the brokerage, $240. What rate do I realize on the investment? ANS.: $6\frac{8}{37}\%$.

75. I have $8,475 invested in U. S. 10–40's at 113. What is my semi-annual income in currency, gold being worth 110? ANS.: $206.25.

76. When gold is worth 128, what half-yearly income in current funds will a person receive who invests $7,540 in U. S. 10–40's when selling at 104? ANS.: $232.

77. What % on my investment will I make by buying U. S. $7\frac{3}{10}$'s at 104? ANS.: $7\frac{1}{52}$.

78. What must gold sell for that a party investing in U. S. 6's may realize 8%? ANS.: $133\frac{1}{3}$.

79. My semi-annual interest in currency is $276 on $9,600 U. S. bonds when gold is at 115. What rate do the bonds bear? ANS.: 5%.

80. When gold is at 115, what amount in currency can be bought for $8,500 in gold? ANS.: $9,775.

81. A broker invested $26,250 in 5–20's at $106\frac{1}{2}$ and sold them at 109. How much did he gain? ANS.: $616.19+.

82. Bought $8,000 in gold at 110, brok. $\frac{1}{8}\%$. What did I pay in currency? ANS.: $8,810.

83. Bought stock at 20% discount, sold out at 112, realizing $2,240. What did I invest? ANS.: $1,600.

84. When gold is at a premium of 25%, what is the discount on greenbacks? ANS.: 20%.

85. What income will be obtained by investing $6,840 in stocks bearing 6% interest at 95? ANS.: $432.

86. U. S. 5-20's pay interest in gold. What will be my income in currency by investing $11,212.50 at 112⅛ when gold is at a premium of 6⅞? ANS.: $641.25.

87. Bonds at 20% premium, brokerage ⅝%, cost $300.87½ more than their face. What was the face of the bonds? ANS.: $1,458$\frac{2}{3}\frac{6}{3}$.

88. A owned .075 of all the stock of a bank. The stock increases .015 the first year. The increase was invested in stock. He gave his son .025 of all the stock then owned by him. What % of the whole stock of the bank did he give away? ANS.: .001875=$\frac{3}{16}$%.

89. Bought a check at 55%; traded it for canal stock at 60%, which bears 7% interest. What % interest do I receive on my investment? ANS.: 21$\frac{7}{3}$%.

90. I invested $2,700 in bonds at 25% discount, which pays 8%. How much must I invest in bonds at 4% discount and paying 10% dividend to secure an equal income? ANS.: $2,764.80.

91. I sold canal stocks at a loss of 15%. I invested the proceeds in R. R. stocks and sell at 15% gain. Do I gain or lose on the two speculations? How many %? ANS.: 2¼% loss.

92. Bought bonds at 10% discount, which rose to 5% premium, and sold for cash. After paying a debt of $33, I invested the remainder in stocks at 102, which at par left me $11 less than at first. How much had I at first? ANS.: $148.50.

93. I buy bonds at 94; sell at 100; my gain is $666; how many $50 shares? ANS.: 222.

94. I exchanged 72 N. Y. bonds ($1,000 each) at 6¼% premium for Ky. bonds ($500 each) at 2% premium. How many of the latter did I get? ANS.: 150.

95. 4% canal stock brings an income of $300, but sells in market for 92%. What amount is invested? ANS.: $6,900.

96. I invested in 5% furnace stock at 75. My income is $180. How much must I invest in 6% state stock at 102 to have the same income? ANS.: $3,060.

97. Which is the better investment, canal 4's, registered at $99\frac{3}{8}$, or U. S. $4\frac{1}{2}$'s at 106. ANS.: Latter $\frac{35}{159}\%$ better.

98. What is the value of 18 shares R. R. stock ($75 each) at 8% discount? ANS.: $1,242.

99. What must be paid for fifteen $100 shares of mining stock at 18% advance? ANS.: $1,770.

100. How much money must I give with nine $100 shares at 15% discount in exchange for eight $100 bonds at 2% discount? ANS.: $19.

101. How many $50 shares at 8% discount must be given for 23 bonds of $100 each at 2% premium? ANS.: 51.

102. I bought 18 shares of $50 each at $\frac{1}{2}\%$ discount and sold at $\frac{3}{4}\%$ premium. What is my gain? ANS.: $11.25.

103. Bought 120 shares of R. R. stock ($10 each) at $1\frac{1}{4}\%$ advance and sold at $\frac{2}{3}\%$ discount. Find my loss. ANS.: $23.

104. I bought stock at 65 and after receiving a dividend of $5\frac{1}{2}\%$ sold it at 82 and made $1,125. How much stock had I and what % did I realize? ANS.: 50 shares; realized $22\frac{1}{2}\%$.

105. I bought stock at 73, and then received $945 as a dividend at $2\frac{1}{4}\%$, when I sold my stock at $86\frac{1}{4}$. How much stock had I and what did I make? ANS.: 420 shares; made $6,510.

106. I bought $9,040 worth of stock at $113, and after receiving a dividend of $5\frac{1}{2}\%$, sold at $111\frac{1}{2}$. How much did I make and how much stock did I buy? ANS.: Made $320; had $8,000 stock.

DISCOUNT.

1. What sum is it whose true discount by simple interest for 4 yrs. is \$25 more at 6% than at 4% per annum? ANS.: \$449.50.

2. I bought a lot for \$156 due in 8 months, and sold it at once for \$180. Find my gain %, int. 4½%. ANS.: $12\frac{75}{310}\frac{4}{29}\%$.

3. If I discount a note at 20% per annum I make 22½% interest per annum; how long does the note run? ANS.: 200 da.

4. I discount a 6 mos. note at $\frac{5}{6}\%$ a month and it yields \$4,800. What was its face? ANS.: \$5,057.06+.

5. Paid \$180 for a claim due in 6 mo. A broker bought the claim same day, taking bank discount at 6%. I cleared \$13.90. What was the amount of the claim. ANS.: \$200.

6. The true discount on a sum for 3 yrs. 4 mo. at 2½% is \$60; and the interest on the same sum for the same time and rate \$65. Find the principle and rate. ANS.: \$780 prin.; $2\frac{5}{39}\%$ rate.

7. How long must a note run discounted at 8% to yield 9% per annum? ANS.: 1 yr. 4 mo. 20 da.

8. The true discount of a debt of \$405 due in 10 mo. 20 da. is \$30. What is the rate? ANS.: 9%.

9. Sold flour for \$3,275.60, half cash, the balance a note at 60 days. If the note is discounted in bank at 10%, what will be the net proceeds of the sale? ANS.: \$3,272.83+.

10. Sold 50 bl. of rum, each containing 31 gal. 2 qt., at \$2.40 a gal., receiving a note at 90 da. What would be the proceeds of this note discounted at 7½%? ANS.: \$3,706.76+.

11. What will be the proceeds of a note of \$999, payable in 97 days, int. 8%? ANS.: \$977.27.

12. The discount of a certain sum at 6% for 180 days was $185.49. What would have been the true discount? ANS.: $180.

13. The present worth is $326.40, true discount $114.24, time 7 yrs. 9 mo. 10 da. Find the rate. ANS.: 4½%.

14. A bank paid $336.43 for a note of $340 discounted at 6%. How long did the note run? ANS.: 60 days.

15. The discount on a debt due in 2 yrs. was $45. What would have been the discount on the same note 10 months before due? ANS.: $26¼.

16. The discount was $3.96 on a note of $396 for 57 days. What was the rate of discount? ANS.: 6%.

17. Find the true discount of a debt of $405 due in 10 mo. 20 da. at 9%. ANS.: $30.

18. The bank discount of a note of $750 was $8.50. What was the time, interest 8%? ANS.: 48 days.

19. What is the present worth of a debt due in 4 yrs. 8 mon. 10 da., the true discount at 6% being $169? ANS.: $600.

20. The bank charged $33.20 and paid $2,366.80 for a note discounted at 6%. How long had it to run? ANS.: 2 mo. 20 da.

21. Rate 8%, discount $105, debt $245. Find the time. ANS.: 9 yrs. 4 mo. 15 da.

22. I received $792 for a note of $800 payable in 42 days. Find the rate. ANS.: 8%.

23. A bank gave $1,385.30 for a note payable in 60 da. How much did they charge for discounting at 6%? ANS.: $14.70.

24. A bank charged $27.30 for discounting a note of $2,600, payable in sixty days. Find the rate. ANS: 6%.

25. The bank discount on a note having 2 mos. to run was $72.66, int. 6%. Find the face. ANS.: $6,920.

26. The proceeds of a note dated Feb. 19th, 1892, payable Jan. 1st, 1893, and bearing 8% int., was $105.51⅛, when discounted Oct. 12th, 1892, at 6%. What was the face of the note? ANS.: $100.

27. For what sum must I give my note for 6 mos. to realize $1,500; int. 10%? ANS.: $1,580.33.

28. What is the present worth and discount at 8% of a note of $500, due in 3 yrs., and bearing interest at 6%? ANS.: P. W., $475.81; dis., $114.19.

29. Find the true discount at 6% of a note of $300, due in 2 yrs., and bearing 8% interest. ANS.: $37.29.

30. Find the present worth and discount of a note of $368.75 for 5 mos., at 10%. ANS.: $354; $14.75.

31. I bought goods amounting to $775, on 4 mos. credit. What would I pay cash if money is worth 10%? ANS.: $750.

32. If money is worth 6%, what sum in cash will pay for a bill of goods amounting to $260, bought on 8 months' credit? ANS.: $250.

33. I can have 4 mos. credit or 5% off for cash. What will be my gain by paying cash on a bill of goods amounting to $2,480, if money is worth 10%? ANS.: $45.47.

34. The difference between the true and bank discount of a certain principal is $2.45 for 1 year. What is the principal, int. 7% (omitting days of grace)? ANS.: $535.

35. I was offered $1,122 for my farm in cash, or $1,221 payable in 10 mos., without interest; I chose the latter. How much did I lose, money being worth 12%? ANS.: $12.

36. I bought goods on 9 mos. credit, amounting to $840.40. How much money will pay the debt at the time of receiving the goods, int. being 8%? ANS.: $792.83.

37. A 30-day note yields $1,650, when discounted at $1\frac{1}{2}$% a month. Find the face. ANS.: $1,677.68.

38. A note discounted at 8% for 40 days yields $2,072.60. Find the face. ANS.: $2,092.60—.

39. At what should I discount a 60-day note to get interest at the rate of 20%? ANS.: $19\frac{67}{207}$%.

40. What is the rate of discount when a note running 1 yr. will produce 25% interest without grace? ANS.: 20%.

41. I offered to sell my farm for $8,000 cash, or for $10,296 in three equal payments, at the end of 1, 2 and 3 yrs., without interest. If money is worth 10%, what will be the gain to the buyer by paying cash? ANS.: $620.

42. What will be the face of my note if I wish to obtain $400 from a bank for 30 days when discounted at 6%? ANS.: $402.21.

43. The bank discount on a certain principal for 1 yr. at 6% is $3.60 greater than the true discount for the same time and rate. Omit days of grace and find the principal. ANS.: $1,060.

EXCHANGE.

1. What is the cost of a draft on Augusta for $5,680, payable in sixty days, exchange being at ½% prem., int. 6%? ANS.: $5,648.76.

2. What is the cost of a draft on Albany for $1,575, payable in 30 days, exchange being at ¾% premium, int. 6%? ANS.: $1,578.15.

3. The face of a draft payable in 60 days is $2,625, exchange being at 1½% premium, int. 6%. Find the cost. ANS.: $2,636.81+.

4. Find the cost of a draft for $500, payable in 30 days after sight, exchange being 1% premium, int. 6%. ANS.: $502.25.

5. How large a draft payable 30 days after sight can be bought for $502.25, exchange being 1% premium and int. 6%? ANS.: $500.

6. How large a draft payable in 60 days can be bought for $798.80, exchange being 1¼% premium and interest 8%? ANS.: $800.

7. A draft payable in 30 days was bought for $352.62, exchange being 1½% discount, and int. 6%. Find the face. ANS.: $360.

8. What must be paid in Baltimore for a draft on Cincinnati, drawn at 90 days for $4,800, the course of exchange being 101⅜, int. 6%? ANS.: $4,791.60.

9. A commission merchant in Albany wishes to remit to his employee, in Columbus, by draft at 60 days, $512.36. What is the face of the draft he can purchase with this sum, exchange 2½% discount? ANS.: $531.218+.

10. What must be paid in New York for a draft on Concord, at 30 days for $5,400, exchange ½% premium? ANS.: $5,397.30.

11. An agent in Harrisburg, Pa., having $1,324.74 due his employee, is instructed to remit the same by a draft drawn at 30 days. What will be the face of the draft, exchange being at 1¾% premium? ANS.: $1,309.03.

12. Exchange on Augusta, Me., for $5,000, cost $5,075. What was the course of exchange? ANS.: 1½% premium.

13. What is the market price of a sight draft on New York for $890, exchange being 101¼%? ANS.: $901.12½.

14. Find the market value of a sight draft on New York for $1,800, exchange 99%. ANS.: $1,782.

15. Find the cost of a draft on Cincinnati for $1,400, payable in 60 days after sight, exchange being worth 102½%, and int. being 7%. ANS.: $1,420.18⅓.

16. What is the cost of a draft on Peoria, Ill., for $2,400, payable in 90 days, int. being 10%, and exchange 103%? ANS.: $2,410.

17. Find the value of a draft on Boston for $1,650, payable 60 days after sight, exchange being 98½, and int. 6%. ANS.: $1,607.925.

18. If exchange is 101½%, how large a sight draft can be bought for $7,900? ANS.: $7,783.25.

19. What is the face of a draft that can be bought for $5,000, when exchange is 98½? ANS.: $5,076.14.

20. What is the face of a draft at 60 days sight, which costs $1,000, exchange being 103% and interest 6%? ANS.: $980.87.

21. What is the cost of a sight bill for £87, when £1 is worth $4.82 in gold, gold being worth 106? ANS.: $444.50+.

22. How large a bill can be bought for $2,000 in currency, when sterling exchange is quoted at $4.85 and gold at 106? ANS.: £389 7+d.

23. What will a check on New York for $1,505.40 cost at ¼% discount? ANS.: $1,501.64—.

24. What will a 60-day draft on Columbus for $12,692.50 cost at ¾% premium, int. off at 6%? ANS.: $12,654.42+.

25. Find the face of a draft on New York that will cost $2,000 at ⅜% premium. ANS.: $1,987.58—.

26. A draft cost $4,681.25, at 1¼% discount. Find the face. ANS.: $4,740.51—.

27. What must be the face of an 18-day draft costing $5,264.15 at ½% premium, int. off at 6%? ANS.: $5,256.27—.

28. A 21-day draft cost me $6,836.75, at ⅛% discount and interest off at 6%. Find the face. ANS.: $6,925.04.

29. What is the cost of a 60-day draft for $850 on New York, exchange being at 101½, int. 6% per annum? ANS.: $853.825.

30. The cost of a 30-day draft was $2,128.525, exchange being 102, int. 7%. Find the face. ANS.: $2,100.

31. What is the cost of a draft of $500 for 60 days at ¾% premium, int. 6%? ANS.: $498.50.

32. I paid $343.22 for a 90-day draft at ½% discount, and int. 6%. Find the face. ANS.: $350.40+.

33. When exchange on New York is 98½, what is the cost of a draft for $362 for 30 days, int. at 6%? ANS.: $354.58—.

34. What is the face of a draft payable 60 days after sight that will cost $652.925, exchange 1½%, int. 6%? ANS.: $650.

35. The face of a draft for 30 days, exchange being 98¾, and interest 6%, was $1,588.595. Find the cost. ANS.: $1,560.

36. What will be the cost in Nashville of a sight draft on Columbus for $1,000, the rate of exchange being ½% premium? ANS.: $1,005.

37. If exchange on Chicago is 1¼% premium, what will be the cost in Memphis, Tenn., of a sight draft of $3,000? ANS.: $3,037.50.

38. A merchant in Chicago bought a draft on Albany, New York, for $5,000, payable 30 days after sight. Find the cost if exchange was ⅛% premium. ANS.: $4,978.75.

39. What will be the cost in Lansing, Mich., of a draft for $1,500 on Cleveland, O., payable 90 days after date, when exchange is ⅛% discount? ANS.: $1,471.875.

40. How much will be realized from the sale of a draft for $6,000 at ¼% discount? ANS.: $5,985.

41. How much will be realized from the sale of a draft on Cincinnati for $3,000, sold at ⅛% premium? ANS.: $3,003.75.

42. When exchange is 100½, what will be the cost of a draft for $5,000, purchased in St. Louis on Denver, to be paid 3 mos. after date? ANS.: $4,928.75.

43. If exchange is 100¼, what will a draft for $1,500 cost, purchased in Detroit, Mich., on Columbus, payable in 2 mos. without grace? ANS.: $1,488.75.

44. If exchange is ¼% premium, what will a draft for $1,500 cost, purchased in St. Paul, Minn., on Zanesville, O., payable in 4 mos. without grace? ANS.: $1,473.75.

45. If exchange is at $\frac{1}{16}$% premium, what will a draft for $5,000 on Memphis, Tenn., cost in New York, payable 2 mos. after date? ANS.: $4,952.50.

46. How large a draft on N. Y. can be purchased for $5,000 when exchange is at 1½% premium? ANS.: $4,926.11—.

47. What will be the cost of a sight draft on N. Y. for $5,725, when exchange is ¼% premium? ANS.: $5,710.71+.

48. Find the face of a 30-day draft purchased for $1,500, if the rate of exchange is ⅛% premium. ANS.: $1,506.40.

49. If I pay $1,200 for a draft payable in 2 mos. when the premium on exchange is ½% and the rate of interest is 9%, what is the face of the draft? ANS.: $1,213.04+.

50. How large a sight draft on St. Paul can be purchased in N. Y. for $10,000 if exchange is ⅛% discount? ANS.: $10,012.51+.

51. How large a draft can I buy on Cincinnati for $1,750 if exchange is at ⅛% premium? ANS.: $1,747.81+.

52. A commission merchant in Denver, Col., sold goods amounting to $3,500 for a man in N. Y. He sent the amount due by a draft payable in 30 da. after sight, exchange being ⅛% premium. How large a draft did he purchase? ANS.: $3,514.93+.

53. Find the face of a draft on London that can be bought in N. Y. for $3,762.50 in currency when gold is at 105½ and exchange is at $4.87. ANS.: £732 6s. 2.4+d.

54. When exchange is $4.86 for a pound sterling and gold is at 107½, what will be the face of a draft that can be bought in N. Y. on London for $2,984.38? ANS.: £571 4s. 6.6+d.

55. I wish to obtain a bill of exchange on Paris, at sight for 3,269 francs. What will it cost, exchange being at 5.15 francs to the dollar and gold at 105⅝? ANS.: $668.87+.

56. When exchange is at 5.19 francs to the dollar and gold at 106¼, what must be paid in currency for a sight bill of exchange on Paris for 8,950 francs? ANS.: $1,832.25—.

57. Find the currency value of a draft on London for £895 10s., when exchange is $4.87 for a pound sterling and gold is at 106⅝. ANS.: $4,650+.

58. When exchange is 5.20 francs for a dollar and gold is worth 106¼, what must I pay for a sight draft on Paris for 5,725 francs? ANS.: $1,169.77+.

59. I purchased a sight draft on London for £585 10s. 5d. Find the currency value of the draft, if exchange was at par and gold 107½. ANS.: $3,059.05+.

60. Gold is quoted at 104⅞. Exchange is $4.88½. Find the cost in currency of a sight draft on London for £875 5s. 4d. ANS.: $4,484.11+.

INSURANCE.

1. I insured ¾ of a shop worth $3,600 and ⅘ of a store worth $6,000. Find the rate of insurance if I paid $126, paying $1 for the policy. ANS.: 1⅔%.

2. It cost me $75 for insuring a store for ⅗ of its value at 1¼%. What was the store worth? ANS.: $10,000.

3. Find the cost of insuring $\frac{5}{8}$ of a factory at $\frac{5}{8}\%$, which is valued at $340,000. ANS.: $1,328.12+.

4. I paid $17.25 for insuring $\frac{3}{5}$ of a building at $1\frac{1}{4}\%$; find the value of the house. ANS.: $2,300.

5. I paid $39 for insuring a building worth $4.550 at $1\frac{1}{5}\%$; what fraction of the value was insured? ANS.: $\frac{5}{7}$.

6. Find the cost of insuring $\frac{5}{6}$ of a building worth $24,000 and $\frac{2}{3}$ of another worth $36,000, the former at $2\frac{1}{4}\%$, the latter at $1\frac{1}{8}\%$. ANS.: $607.50.

7. A shipment of goods costing $1,275 is insured at $\frac{5}{9}\%$, the policy costing $1.00; find the cost of insurance. ANS.: 8.08\frac{1}{3}$.

8. I paid $19.20 for insuring $\frac{2}{3}$ of a barn worth $4,800. What was the rate? ANS.: $\frac{3}{5}\%$.

9. I insured a house at $1\frac{1}{2}\%$; reinsured $\frac{2}{5}$ of it at 2%, and $\frac{1}{4}$ of it at $2\frac{1}{2}\%$; what rate of insurance do I get on the remainder? ANS.: $\frac{3}{14}\%$.

10. I took a risk of $45,000; reinsured at the same rate $1,000 each in five offices, and $5,000 in another. Find the rate of insurance, my share being $262.50. ANS.: $2\frac{5}{8}\%$.

11. I took out a life policy at the age of 21 for $5,000. The annual premium is $19.89 on $1,000. What will it cost me to keep up my insurance if I live to be 75 yrs. old? ANS.: $5,370.30.

12. I wish to secure an endowment policy for $1,000 payable in 10 yrs., annual premium costs $104.58. Find the amount of the 10 payments, allowing int. at 6%. ANS.: $1,390.91+.

13. I received $118 for insuring a building at $\frac{4}{5}\%$. Find the value of the building. ANS.: $14,750.

14. I received $42.30 for insuring $\frac{5}{8}$ of a house at $\frac{9}{10}\%$; what is the value of the house? ANS.: $7,520.

15. My share of the premium was $197.13 after taking $\frac{1}{2}$ of a risk at $2\frac{1}{2}\%$, and reinsuring $\frac{3}{5}$ of it at $2\frac{1}{2}\%$. Find the amount of the risk. ANS.: $262,840.

16. Took a risk at $1\frac{3}{5}$, reinsured $\frac{1}{2}$ of it at the same rate, and $\frac{1}{3}$ of it at $1\frac{1}{2}\%$. How large was the risk, my share of the premium being $58.11? ANS.: $19,370.

17. I insured property at 2%; reinsured $8,000 at $1\frac{3}{4}\%$, and $10,000 of it at $2\frac{1}{8}\%$. What was the amount insured, my share of the premium being $207.50? ANS.: $28,000.

18. For how much must a ship worth $2,000 be insured, so that the insurance will cover $\frac{3}{4}$ of the value and premium at $1\frac{1}{2}\%$? ANS.: $1,522.842.

19. I received $225 for insuring a store and contents for $\frac{3}{4}$ of their value at $1\frac{1}{2}\%$. The stock was worth $\frac{1}{2}$ as much as the store. Find the value of each. ANS.: Stock, $6,666.66\frac{2}{3}$; store, $13,333.33\frac{1}{3}$.

20. I paid $325 for insuring my store for $16,250. What was the rate of premium? ANS.: 2%.

21. I paid $2,475 for insuring $\frac{2}{3}$ of my property at $1\frac{1}{4}\%$. Find the amount of my property. ANS.: $297,000.

22. I insured my property for $\frac{3}{4}$ of its value at $2\frac{1}{2}\%$, paying $1,657.50. What was the value of my property? ANS.: $88,400.

23. I paid $400 for having $\frac{2}{3}$ of my property insured at $4\frac{1}{2}\%$. Find the value of the property. ANS.: $13,333.33$\frac{1}{3}$.

24. My stock of goods is worth $30,000; insured it for $\frac{3}{4}$ of its value at $\frac{3}{4}\%$. In a fire I saved $5,000 of goods. What was my loss? ANS.: $25,168.75.

25. I paid $180 for insuring my stock for $\frac{2}{3}$ of its value at 3%. What is the value of the stock? ANS.: $9,000.

26. Mr. Jones paid $652.50 for insuring a mill worth $43,500. Find the rate. ANS.: $1\frac{1}{2}\%$.

27. I paid $175 for insuring my house at $1\frac{1}{4}\%$. It was destroyed by fire. How much insurance did I procure? ANS.: $14,000.

28. What will be the annual premium on a life policy of $5,000 at $21.10 per $1,000? ANS.: $105.50.

29. A person 33 years of age pays $123.90 annual premium on a life insurance policy of $5,000. Find the rate. ANS.: $2\frac{39}{50}\%$.

30. My building is worth $150,000 and is insured for $\frac{3}{4}$ of its value in three companies; the first takes a $\frac{1}{5}$ risk at $\frac{3}{5}\%$, the 2d a $\frac{1}{4}$ risk at $\frac{3}{4}\%$, and the 3d the remainder at $\frac{3}{5}\%$. What is the premium? ANS.: $717.18.

31. My goods worth \$6,000, and insured at $2\frac{1}{4}\%$, were damaged $65\frac{3}{4}\%$. What did the company have to pay above the premium? ANS.: \$3,810.

32. I bought 1,500 bu. of wheat at \$1.10 per bushel, and had it insured at \$1.20 per bushel at $2\frac{1}{2}\%$. It was all destroyed by fire; what is my gain? ANS.: \$105.

33. An insurance company took a risk on a vessel for \$100,000 at $\frac{3}{4}\%$, but deeming the risk too great reinsured \$60,000 at $\frac{1}{8}\%$; what was the amount received more than paid? ANS.: \$225.

34. The premium at 3% is \$378; what is the value of the property insured? ANS.: \$12,600.

35. At what must property worth \$1,950 be insured at $2\frac{1}{2}\%$ so as to include premium in case of loss? ANS.: \$2,000.

36. I had 9,700 bushels of wheat worth \$1.20 per bushel; I had it insured at 3%, so as to cover premium and loss. For what was it insured? ANS.: \$12,000.

37. For what sum must I have my property worth \$2,600 insured, premium at $\frac{7}{10}\%$, to cover property? ANS.: \$2,618.26+.

TAXES.

1. Find the tax to be raised in a township whose taxable property is worth \$486,250, the rate of taxation being 78 cts. on \$100. ANS.: \$3,792.75.

2. My property is assessed at \$3,800. What is my whole tax if the rate of taxation is $\frac{78}{100}\%$ and I pay a poll-tax of \$1? ANS.: \$30.64.

3. My whole tax is \$53.46. I pay for 3 polls at \$1.50 each. I own \$8,704 taxable property. Find the rate of taxation. ANS.: $56\frac{1}{4}$ cts. on \$100.

4. My income is 16% of my capita. I am taxed $2\frac{1}{2}\%$ of my income and pay \$26.04. What is my capital? ANS.: \$6,510.

5. I sold my property for $7,599, which was cost, and 2% besides paid for tax. What was the cost? ANS.: $7,450.

6. I pay a tax of $1.35 on $100 on my capital and I have left $125,127.66. What was my capital and tax? ANS.: Capital, $126,840; tax, $1,712.34.

7. Find the value of the taxable property in a village containing 1,024 polls paying $1 each, that pays a tax of $4,000, taxation being 2.4 mills on the dollar. ANS.: $1,240,000.

8. A's real estate is assessed at $4,300, and personal property at $1,940; pays for 2 polls at $1; is taxed $33.20. What was the % of tax? ANS.: ½%.

9. In a township whose valuation is $6,748,950, the rate of tax is $3\frac{6}{10}$%; the collector is paid 1½% for collecting. What is the amount collected, and what are the collector's fees? ANS.: Amount, $239,317.76; fees, $3,644.43+.

DUTIES OR CUSTOMS.

1. Find the duty on 3 boxes of tin weighing 111, 112 and 113 lbs., respectively, at 5 cts. a lb., tare 5%. ANS.: $15.96.

2. What is the duty at 4% on 20 boxes, each containing 250 lbs. of tobacco costing 20 cts. a lb., tare 6¼%? ANS.: $37.50.

3. I received 3,724 yds. of cloth invoiced at 23 cts. a yd.; the duty is 10 cts. a yd. and 11% ad valorem, less 10%. What is the total amount of duty? ANS.: $419 96 –.

4. Find the duty on 45 barrels of whisky, each containing 36 gal., invoiced at $1.25 per gal., at 40% ad valorem, allowing 2% for leakage. ANS.: $793.80.

5. What is the duty on 12 98-lb. boxes of soap, tare 10%, at 5 cts. a lb.? ANS.: $52.92.

6. What is the duty on 36 boxes of sugar, each weighing 668 lbs., at 2½ cts. a lb., deducting $\frac{1}{7}$ of the entire weight for tare? ANS.: $515.31.

7. Find the duty on oilcloth 40 yds. long and $3\frac{3}{5}$ yd. wide, worth 75 cts. a sq. yd., at 30% ad valorem. ANS.: $35.07+.

8. What is the duty on 30 bags, each weighing 760 lbs., tare 12%, at $1.20 a cwt.? ANS.: $240.76+.

9. What is the cost per gal. of Jamaica rum if I pay $631.43 for 1,680 gal., duty 15%, leakage 2%, charges $53.34? ANS.: 30 cts.+.

10. Find the invoice price of an amount of cloth after paying 30% duty and other charges $73.80, and cost in store $7,389.03. ANS.: $5,627.10.

11. A wine merchant imported 60 casks of wine, 54 gal. each, invoiced at $1.80 a gal., transportation 25 cents a gallon, charges $8.50, leakage 5% and duty 20%. What was the entire cost? ANS.: $7,758.58.

12. I paid $184.80 duty on 50 bbls. of sugar, weighing 220 lbs. each, gross tare 4%, invoiced at 5 cts. a pound. What was the rate? ANS.: 35%.

13. What is the duty at 15% on 540 bags of coffee, gross weight 160 lbs. each, tare 3½%, invoiced at 9 cts. a pound? ANS.: $1,125.57+.

14. What is the duty at 28% on 25 cases of cloth containing 24 pieces each, 45 yds. in a piece, and worth $1.13 a yard? ANS.: $8,542.80.

15. What is the duty on 12 barrels of whisky of 42 gal. each, invoiced at $1.30 per gallon at 31½%, leakage 5%? ANS.: $196.07—.

16. A imported 40 rolls of carpet, 160 yds. each, and paid $1,024 duty at 20%. At what price per yd. was the carpet invoiced? ANS.: 80 cts.

17. What is the duty on 20 boxes of raisins of 25 lbs. each, valued at 10 cts. a pound, allowing 15% for tare, when the rate of duty is 6% ad valorem? ANS.: $2.55.

18. What is the duty on 7 tons of steel of 2,240 lbs. each, invoiced at 17 cts. per lb. when the rate of duty is 20% ad valorem? ANS.: $533.12.

19. Find the duty on 20 hhds. molasses, each containing 63 gal., at 9 cts. per gal., allowing 5% for leakage. ANS.: $107.73.

20. What is the duty on 10 barrels of Havana tobacco, each weighing 145 lbs. gross, tare 8%, at 6¾ cts. a pound? ANS.: $90.04+.

21. When there is a duty on tea of 10 cts. a pound, what must be paid on 45 chests of tea, each weighing 120 lbs., tare 10%? ANS.: $486.

22. What is the duty on 210 bags of coffee, the gross weight of each being 190 lbs., invoiced at 5 cts. a pound, the tare being 5% and duty 25%? ANS.: $473.81+.

23. What is the duty at 40% ad valorem on 15 cases of broadcloth, each containing 25 pieces of 35 yds., invoiced at $3.95 a yd. ANS.: $20,737.50.

24. The duty on 15 gross of bottle beer, allowing 10% breakage, was $40.50 at 20% ad valorem. How much a dozen were they invoiced at? ANS.: $1.25.

25. The duty on 100 pieces of silk of 18 yds. each was $337.50 at 25% ad valorem. What was the invoice price per yd., and what must I sell it per yd. to gain 20%? ANS.: Invoiced at 75 cts. per yd.; selling price $1.12½.

26. Paid $806.12 duty on cloth at 35%. What were they invoiced at, and what did they cost in store? ANS.: Invoiced at $2,303.17; cost $3,109.27+.

27. I pay a duty of $1,473.80 on goods valued at $3,684.50. What is the rate of duty? ANS.: 40%.

PROPORTION.

1. The first, third and fourth terms are 8.4, 9⅓ and 5½. What is the second? ANS.: 4.95.

2. The last three terms are 9⅕, 1⅛ and 8⅕. What is the first term? ANS.: 1¼.

3. If I can build $\frac{8}{5}$ rods of wall in $\frac{3}{7}$ of a day, how much can I build in $\frac{9}{14}$ of a day? ANS.: $\frac{9}{10}$ rd.

4. 35 men have flour for 24 days. If 14 leave, how long will it feed the remainder? ANS.: 40 days.

5. If the consequent is $\frac{2}{5}$ and the ratio $\frac{1}{8}$, what is the antecedent? ANS.: $\frac{1}{20}$.

6. If the antecedent is 6 and the ratio $1\frac{1}{5}$, what is the consequent? ANS.: 5.

7. What is the ratio of a pound troy to a pound avoirdupois? ANS.: $\frac{144}{175}$.

8. What is the difference between the compound ratios $\left\{\begin{matrix}3:4\\5:9\end{matrix}\right\}$ and $\left\{\begin{matrix}1:6\\2:7\end{matrix}\right\}$ ANS.: $\frac{31}{84}$.

9. What is the difference between the ratio $4\frac{2}{3} : 7\frac{1}{2}$ and the inverse ratio? ANS.: $\frac{1}{1}\frac{2}{2}\frac{4}{6}\frac{1}{0}$.

10. If the ratio is $2\frac{1}{4}$ and the consequent is $6\frac{1}{2}$, what is the antecedent? ANS.: $14\frac{5}{8}$.

11. Find the inverse ratio of the two numbers $6\frac{1}{2}$ and $2\frac{1}{4}$. ANS.: $\frac{4}{9}$.

12. A certain number has been divided by one more than itself, giving a quotient $\frac{1}{5}$. What is the number? ANS.: $\frac{1}{4}$.

13. If 48 lbs. of salt water contain $1\frac{1}{2}$ lbs. of salt, how much fresh water must be added to these 48 lbs. so that 40 lbs. of the mixture shall contain $\frac{1}{2}$ lb. of salt? ANS.: 72 lbs.

14. Divide the number $3\frac{1}{2}$ into two such parts that the first shall equal the second plus $\frac{1}{15}$. ANS.: $1\frac{43}{60}$ and $1\frac{47}{60}$.

15. A, B and C earned \$3,456; B earned 3 times as much as C and A 4 times as much as B. How much did each earn? ANS.: A, \$2,592; B, \$648; C, \$216.

16. A and B have 2,255 bu. of corn; $\frac{3}{4}$ of A's equals $\frac{5}{7}$ B's amount. How many bushels has each? ANS.: A, 1,100; B, 1,155.

17. The difference between two numbers is 120, and $\frac{7}{8}$ of the first equals $\frac{6}{7}$ of the second. What are the numbers? ANS.: 1,296 and 1,176.

18. The sum of two fractions is $1\frac{7}{12}$, and $\frac{3}{4}$ of the first equals $\frac{5}{6}$ of the second. Find the fractions. ANS.: $\frac{5}{6}$ and $\frac{3}{4}$.

19. John has $637 less than James, and $\frac{4}{5}$ of James' equals $1\frac{1}{2}$ times John's. How much has each? ANS.: John, $728; James, $1 365.

20. A and B have 13,650 sheep; 5 times A's equals 8 times B's. How many has each? ANS.: A, 8,400; B, 5,250.

21. A bought a farm, store and a house for $28,100. The farm cost three times as much as the house, plus $450; and the store cost twice as much as the farm, minus $650. What was the cost of each? ANS.: Store, $16,450; farm, $8,550; house, $2,700.

PARTNERSHIP.

1. A, B and C buy property for $2,500; A pays $500; B, $1,200; C, $800; they rent it for $300. What is each one's share of the rent? ANS.: A's, $60; B's, $144; C's, $96.

2. X, Y and Z rent a farm for $1,200; X pastures 16 cows; Y, 14 cows, and Z, 12 cows. How much should each pay? ANS.: X, 457\frac{1}{7}$; Y, $400; Z, 342\frac{6}{7}$.

3. A, B and C buy a store; A puts in $18,000; B, $6,000; C, $10,000; they lose 30% of their stock by fire and sell the remainder at a gain of 50%. What is each one's share of the gain? ANS.: A's, $900; B's, $300; C's, $500.

4. What is the stock of each, when A, B and C gain $2,250; A's gain is $800, B's gain is $1,000, and C's capital is $3,000? ANS.: A's, $5,333$\frac{1}{3}$; B's, $6,666$\frac{2}{3}$.

5. Ray Jones willed his son $6,500; his wife, $8,000, and his daughter, $5,500; his estate amounted to only $12,000. What did each get? ANS.: S, $3,900; W, $4,800; D, $3,300.

6. A, B and C buy a store for $16,000; A pays $5,000; B, $6,500; C, $4,500; they pay $2,500 for clerks, $600 for rent, then sold out for $23,000. What did each gain? ANS.: A, $1,218.75; B, $1,584 37$\frac{1}{2}$; C, $1,096.87$\frac{1}{2}$.

7. X, Y and Z hire a pasture for $87.20; X puts in 3 cows for 16 weeks; Y, 5 cows for 20 weeks; and Z, 7 for 10 weeks. How much does each pay, and what is the pasturage of a cow per week? ANS.: X, $19.20; Y, $40; Z, $28; P, 40 cts. a week.

8. A, B and C, on closing business, paid $2,706. A had $4,200 invested; B, $3,600; C, $4,500. What amount did each pay? ANS.: A, $924; B, $792; C, $990.

9. A, B and C do a piece of work for $1,600; A furnishes 7 men 30 days; B, 5 men 40 days, and C, 6 men 32 days. How much should each receive if they pay $95 for clerks? ANS.: A, $525; B, $500; C, $480.

10. X invested $675; B, $810 for the same time; X's gain was $125. What was the whole gain? ANS.: $275.

11. A invested $2,500; two months afterward B joined him with $3,000; in two yrs. they cleared $2,835. Divide their gain. ANS.: A, $1,350; B, $1,485.

12. A, B and C invested $1,000 each; A's money was in 10 mos.; B's, 12 mos.; C's, 14 mos.; they sold for $2,730. What did each lose? ANS.: A, $75; B, $90; C, $105.

13. Divide 756 into two parts, which shall be to each other as 7.5 to $\frac{3}{8}$. ANS.: 720 and 36.

14. Divide 10.25 into two parts to each other as $1\frac{2}{3}$ to $2\frac{1}{2}$. ANS.: 4.1 and 6.15.

15. A, B and C bought a horse for $100, sold at a gain of 50%, by which A gained $18, and B $19. How much did each pay for the horse? ANS.: A, $36; B, $38; C, $26.

16. A pastures 8 horses 3 weeks 2 days; B, 12 horses 4 weeks 1 day. What part should each pay? ANS.: A, $\frac{46}{133}$; B, $\frac{87}{133}$.

17. A company charter a boat for a picnic for $50; having but 210 to go, they receive on board another company of 140. What should the second company pay? ANS.: $20.

18. A and B rent a lot for $50; on dividing, A's tract is 80 yds. long and 60 yds. wide; B's, 64 rds. long and 50 rds. wide. What should each pay? ANS.: A, $30; B, $20.

19. A, B and C gain $3,250; A puts in $2,500; B, $1,500; after 9 mos. they take in C with $5,000; 9 mos. after this they quit. Divide their gain. ANS.: A, $1,250; B, $750; C, $1,250.

20. X and Y hire a pasture for $275; X puts in 80 sheep and Y 100; after 6 mos. they each sell $\frac{1}{2}$ of their sheep, and allow C to feed 50 sheep the rest of the yr. How much should each pay? ANS.: A, 103.12\frac{1}{2}$; B, 128.90\frac{5}{8}$; C, 42.96\frac{7}{8}$.

21. A's stock is to B's as 4 to 5; after 3 mos. A withdraws $\frac{1}{3}$ of his and B $\frac{1}{4}$ of his. Divide $1,695 at the end of the year. ANS.: A, $720; B, $975.

22. A, B and C's capital is as $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$; after 4 mos. A takes out $\frac{1}{2}$ of his; after 9 mos. more their gain was $1,988. Divide it. ANS.: A, $714; B, $728; C, $546.

23. A's capital is $4,200; B's $5,600; after 4 months how much must A put in to entitle him to half the year's gain? ANS.: $2,100.

24. A furnishes 404 bus. of corn at 50 cts. per bu.; B, 340 bus. of wheat at $1.10 per bu.; they gain $31.68. What did each gain? ANS.: A, $11.11; B, $20.57.

25. A put in $7,000 for 6 mos.; B put in $5,000 and received $\frac{5}{11}$ of the profit. How long was his money invested? ANS.: 7 mos.

EQUATION OF PAYMENTS.

1. I wish to pay $600 in one payment, instead of paying $50 on the first day of each mo. of the yr. When should I pay it? ANS.: In 5$\frac{5}{6}$ mos.

2. I owe $900, due in 12 months; if I pay $300 now, when shall I pay the balance? ANS.: 18 mos.

3. Bought goods as follows: Jan. 15, $30; Jan. 27, $80; Feb. 8, $70; Feb. 24, $60. Find the equated time. ANS.: Feb. 5.

4. May 1, I owe $300; July 12, $700; and Sept. 22, $800. When may I pay them all together? ANS: Aug. 1.

5. I exchanged three notes: one of $500 at 4 mos., $600 at 5 mos., and $400 at 7 mos., for one of $1,500. How long should the $1,500 note run? ANS.: 5 mos. 6 days.

6. I owe $900, due Jan. 12; $1,000, July 12; and $1,100, Sept. 12. When can I pay them all together? ANS.: June 11.

7. A owes $500 due May 4, and $500 May 26. When should both be paid? ANS.: May 15.

8. Suppose $300 is due in 14 days, and $6,000 in 35 days. At what time should both be paid? ANS.: In 34 days.

9. I bought a farm for $10,500, payable in 6 mos.; I paid $2,000 in 2 mos., and $4,500 in 4 mos. How much time should I have on the remainder? ANS: $11\frac{1}{2}$ mos.

10. Bought a house for $10,000, to be paid for as follows: $\frac{1}{4}$ in 6 mos., $\frac{1}{3}$ in 1 yr. 6 mos., and the remainder in $2\frac{1}{2}$ yrs. Find the average time of payment. ANS.: 1 yr. 9 mos. 18 days.

11. I paid $600 in 5 mos., $1,000 in 10 mos., $1,200 due in $7\frac{5}{6}$ mos. What would have been the average time of payment? ANS.: 8 mos.

12. I sold $2,100 worth of goods Apr. 1, to be paid as follows: $300 in 4 mos., $800 in 5 mos., and $1,000 in 8 mos. Find the equated time of payment. ANS.: $6\frac{2}{7}$ mos.

13. I bought $1,800 worth of wheat June 1, to be paid for as follows: $300 in 30 days, $600 in 60 days, and $900 in 90 days. What is the equated time of payment? ANS.: Aug. 10.

14. I owe $840 due Oct. 3; if I pay $400 July 1, $200 Aug. 1, when should I pay the balance? ANS.: Apr. 30, next year.

15. I bought a house and lot for $12,000, $\frac{1}{3}$ in cash and the balance in two equal payments at 3 and 6 mos.; I pay $\frac{1}{4}$ down and the balance in three equal payments at equal intervals. What is the interval? ANS.: 2 mos.

16. I exchanged three notes, $300 due in 10 days, $500 due in 25 days, $1,000 due in 40 days, for $600 cash and two notes for $550 and $650 due at equal intervals. Find the interval. ANS.: 30 days.

17. I owe a certain sum, $\frac{1}{4}$ of which is due in 3 mos., $\frac{1}{2}$ in 6 mos., and the remainder in 8 mos. What is the average time of payment? ANS.: $5\frac{3}{4}$ mos.

18. I lent A $400 for 6 mos.; at another time $600 for 8 mos. For how long a time must A lend me $900 to balance the favor? ANS.: 8 mos.

19. A owes $600, due in 6 mos.; 4 mos. before it is due $200 is paid, and 2 mos. before it is due $200 more is paid. How long after the expiration of the 6 mos. may the remaining $200 remain unpaid? ANS.: 6 mos.

ALLIGATION.

1. I mix 3 lbs. of sugar at 10 cts., 5 lbs. at 8 cts., and 2 lbs. at 15 cts. What is the average price per pound? ANS.: 10 cts.

2. How much worsted goods at 10, 13 and 15 cts. a yard must I sell that the average price may be 12 cts. a yard? ANS.: 4 at 10 cts., 2 at 13 cts., and 2 at 15 cts.

3. A buys hogs at $5, $6, $7 and $10 a head; how many of each did he buy if the average price was $7.50? ANS.: 1 at $5, 5 at $6, 5 at $7 and 5 at $10.

4. How many pounds of coffee at 12, 15, 18 and 20 cts. a pound must be sold that the average price per pound may be 16 cts.? ANS.: 1 at 12, 2 at 15, 1 at 18 and 1 at 20 cts.

5. A merchant sold 25 yards of ribbon at 12 cts. a yard; how much must he sell at 8 and 15 cts., respectively, that the average price may be 13 cts.? ANS.: 25 yds. at 8 cts., 25 at 12, and 75 at 15 cts.

6. I buy corn at 60, 62 and 65 cts. a bushel; how much did I buy of each if I bought 70 bu. at 70 cts. a bu., and the average price is 67 cts.? ANS.: 15 bu. of each.

7. I have 6 gal. of rum 95% strong and some 90% strong; how much water and how much of the 90% rum must be mixed with the 6 gal. that the strength may be reduced to 80%? ANS.: 3 gal. at 90%, and $1\frac{1}{2}$ gal. water.

8. How much sugar at 8, 9, 12 and 15 cts. a pound must be mixed so as to fill an order of 300 lbs. at 10 cts.? ANS.: 150 at 8 cts., 60 at 9 cts., 30 at 12 cts., and 60 at 15 cts.

9. B hired 10 laborers for 5 weeks, consisting of men and boys, men at $15 a week, and boys at $5 a week; he paid them all $450; how many were there of each? ANS.: 4 men and 6 boys.

10. Sold 100 lbs. of coffee for $33; some sold at 30 cts., some at 28 cts., and some at 35 cts. a pound; how many pounds were there of each? ANS.: 12 at 30 cts., 20 at 28 cts., and 68 at 35 cts.

11. I buy geese at 85 cts., ducks at 30 cts., and chickens at 40 cts. each; in all, 80 fowls for $48; how many of each were there? ANS.: 40 geese, 20 ducks and 20 chickens.

12. What is the average price of 7 articles, 5 at $1 each, the others at 2 cts. each? ANS.: 72 cts. each.

13. A man mixed 4 gal. of whisky at 50 cts. a gal., 2 quarts of alcohol at 80 cts. a qt., and 1 gal. of water; what was the mixture worth per gal.? ANS.: $50\frac{10}{11}$ cts.

14. What relative number of sheep at $3, $5 and $10 a head can be bought at an average value of $7 per head? ANS.: 1 at $3, 1 at $5 and 2 at $10.

15. I have a compound containing 15 lbs. of copper, whose specific gravity is $7\frac{3}{4}$; $\frac{1}{4}$ lb. of silver, specific gravity $10\frac{1}{2}$; and 8 lbs. of iron, specific gravity $6\frac{7}{8}$. What is the specific gravity of the compound? ANS.: $7\frac{9}{20}$ nearly.

ARITHMETICAL PROGRESSION.

1. The first payment was 50 cts., the 2d 53, the 3rd 56, and so on. What was the 19th payment? ANS.: $1.04.

2. Find the 20th term of a decreasing series whose first term is 94, second 92, and so on. ANS.: 56.

3. First term 43, com. dif. $\frac{7}{1\frac{2}{2}}$; find the 37th term of an increasing series. ANS.: 64.

4. If A makes $939 the first month, and each succeeding month $80 less, find the profits in one year. ANS.: $5,988.

5. If 100 apples were placed two yds. apart in a straight line, what distance must a person travel to gather them singly into a basket placed in line and 2 yds. from the first apple? ANS.: $11\frac{21}{44}$ mi.

6. I sold 1,000 sheep at 10 cts. for the first, 20 for the second, and 30 for the third, etc. What did I receive for the sheep? ANS.: $50,050.

7. I employed a clerk on the following terms for 10 mos.: $20 for the first mo., $30 for the second, $40 for the third, etc. What did I pay for the whole time? ANS.: $650.

8. A board 10 ft. long is $2\frac{1}{2}$ in. wide at the narrow end and increases in width $1\frac{1}{2}$ in. for every foot in length. What is the width of the wide end? ANS : 16 inches.

9. The first term is 4, the last term 49, the number of terms 10. What is the sum of the series? ANS.: 265.

10. A buys a farm on monthly payments, to be paid in 3 yrs. 10 mos. The 5th payment was $21, the 20th $60. What did he pay for the farm? ANS.: $2,971.60.

GEOMETRICAL PROGRESSION.

1. A travels 96 mi. the first day, and on each succeeding day $\frac{3}{4}$ as far as on the preceding day; how far did he go on the 5th day? ANS.: 30 mi. 3 fur.

2. What is the 7th term of the series 128, 192, 288, etc.? ANS.: 1458.

3. A hound and a fox are 20 rds. apart. The hound runs 10 rds. while the fox runs 9 rds. At this rate how far will the hound run to catch the fox? ANS.: 200 rds.

4. B engaged to work 20 da. for $\frac{1}{2}$ of a cent for the first day, 1 cent for the second, 2 cents for the third, and so on. How much, at this rate, will he receive for the 20 days? ANS.: $5,242.87\frac{1}{2}$.

5. What is the last term in the series whose 3d term is 16; and common ratio 6; number of terms 9? ANS.: 746,496.

6. Suppose the 33d term is 1,024, common ratio $\frac{3}{4}$; find the 40th term. ANS.: $136\frac{11}{16}$.

7. Find the sum of the infinite geometrical series of 1, $\frac{1}{2}$, $\frac{1}{4}$, etc. ANS.: 2.

8. Find the sum of the infinite geometrical series of $1\frac{1}{6}$, 1, $\frac{6}{7}$, etc. ANS.: $8\frac{1}{6}$.

9. The first term is 8; fourth term 512. Find the common ratio. ANS.: 4.

10. Insert one geometric mean between 3 and 27. ANS.: 9.

11. Insert two geometric means between 4 and 32. ANS.: 8 and 16.

TIME.

1. The time past noon is $\frac{2}{3}$ of the time past midnight. What is the hour? ANS.: 8 o'clock P. M.

2. The time past noon is $\frac{1}{2}$ of the time from now to midnight. What is the hour? ANS.: 4 o'clock P. M.

3. What is the time of day if the time past noon is $\frac{5}{11}$ of the time past midnight? ANS.: 10 o'clock P. M.

4. What is the time of day if the time past noon is $\frac{5}{11}$ of the time to midnight? ANS.: 45 min. past 3 P. M.

5. $\frac{3}{5}$ of the time past noon equals $\frac{3}{10}$ of the time to midnight. What is the time? ANS.: 4 o'clock P. M.

6. At what time between 7 and 8 o'clock are the hour and minute hands together? ANS.. $38\frac{2}{11}$ min. after 7.

7. What is the time of day when $\frac{6}{7}$ of the time past noon equals $\frac{6}{29}$ of the time to 12? ANS.: $2\frac{1}{3}$ P. M.

8. If $\frac{3}{5}$ of the time past noon equals $\frac{9}{27}$ of the time to midnight, what is the time? ANS.: $17\frac{1}{7}$ min. after 4 P. M.

9. What is the time of day when $\frac{2}{5}$ of the time past noon equals $\frac{3}{15}$ of the time to the second midnight? ANS.: $1\frac{1}{4}$ o'clock A. M.

10. If $\frac{1}{2}$ of the time past midnight equals $\frac{1}{4}$ of the time to midnight, what is the hour? ANS.: 8 o'clock P. M.

11. If the time past noon increased by 90 min. equals $\frac{5}{11}$ of the time from noon to midnight, what is the time? ANS.: $57\frac{3}{11}$ min. past 3 P. M.

12. When the hour hand is 22 min. ahead of the min. hand, how far must the min. hand go to overtake the hour hand? ANS.: 24 min.

13. At what time between 9 and 10 will the hour hand be 1 minute-space behind the minute hand? ANS.: $9\frac{9}{11}$ min. before 10 o'clock.

14. At what time between 10 and 11 o'clock are the hands of a clock opposite? ANS.: $21\frac{9}{11}$ past 10.

15. At what time between 4 and 5 o'clock are the hour and minute hands 10 minutes apart? ANS.: $32\frac{8}{11}$ min. past 4 and $10\frac{10}{11}$ min. past 4.

16. At what time between 8 and 9 is the minute hand midway between twelve and the hour hand? When is the hour hand as far behind the minute hand as it is past 6? ANS.: $20\frac{20}{23}$ min. past 8; and 60 min. past 8, or 9 o'clock.

17. At what time between 5 and 6 o'clock is the hour hand midway between 4 and the minute hand? ANS.: 36 min. after 5.

18. The time past noon is $\frac{7}{17}$ of the time to 4 o'clock P. M. What is the time? ANS.: $1\frac{1}{6}$ o'clock P. M.

APPLICATION OF SQUARE ROOT.

1. Find the side of a square field containing one acre. ANS.: 12.64+rds.

2. Find the side of a square field containing 10 acres. ANS.: 40 rds.

3. What will the lumber cost that will fence a square field, 5 rails high, containing 10 acres, with post and rail fence, allowing 15 ft. to the panel, rails at $6 a hundred and posts $40 a hundred? ANS.: $123.20.

4. The entire surface of a cubical block is 216 sq. ft. What is the side of one face? ANS.: 6 in.

5. How long must a tape-line be to wind spirally around a cylinder that is 50 ft. long and 8 ft. in circumference, if it pass once around in every 6 ft. of the cylinder's length? ANS.: $83\frac{1}{3}$ ft.

6. Two freight trains start at the same point, one going due south at the rate of 15 miles an hour, and the other due east at the rate of 18 miles an hour. How far apart were they at the end of 6 hrs.? ANS.: 140.58+miles.

7. What is the distance around a rectangular field containing 20 acres whose length is twice its breadth? ANS.: 240 rds.

8. The area of a rectangle is 5,408 sq. ft., and is composed of two squares. What is the length of its sides? ANS.: 52 ft. wide, 104 ft. long.

9. A room is 100 ft. long, 60 ft. wide and 26 ft. high. What is the distance from a lower corner to the opposite upper corner? ANS.: 119.48+ft.

10. Hypotenuse 50; the base and perpendicular equal. Find them. ANS.: 35.35+.

APPLICATION OF CUBE ROOT.

1. A cubical box holds one bu. What is the inside measure? ANS.: 12.9+in.

2. The volume of a cube is $15\frac{5}{8}$ cu. ft. Find its surface in sq. in. ANS.: 5,400 sq. in.

3. Find the difference between 6 cu. in. and a 6 in. cube. ANS.: 210 cu. in.

4. What is the size of a cubical cistern which holds 1,500 gal. of water? ANS.: 70.23+cu. in.

5. What are the dimensions of a cubical pile of wood which contains 80 cords? ANS.: 21.71+ft.

6. What are the dimensions of a cellar, from which 192 cubic yds. of earth were removed, if the length is 4 times and the width 6 times its depth? ANS.: 6, 24 and 36 ft.

7. A stick of timber contains $13\frac{1}{2}$ cu. ft. Its length is 32 times its width or thickness. Find its dimensions. ANS.: 24 ft. long and 9 in. square.

8. A cubical box has a capacity of 2,048 cu. ft. What are the dimensions of 4 equal cubical boxes that can be placed in it? ANS.: 8 ft.

9. I have 8 boxes containing 729 cu. ft. each. What is the side of a cubical box equal in capacity to the 8? ANS.: 18 ft.

10. I wish to make a wagon bed to hold 100 bu., the length being 3 times the width and height. What will be the dimensions? ANS.: 3.46+ft. high; 10.38+length.

MEASUREMENTS.

1. What is a cylindrical stack of clover hay worth that is 12 ft. in diameter and 10 ft. high at $15 a ton? ANS.: $30.84+.

2. How much timothy hay will a mow hold that is 20 ft. square and 15 ft. deep? ANS.: $13\frac{1}{3}$ tons.

3. How much clover hay in a mow that is 30 ft. long, 20 ft. wide and 20 ft. deep? ANS: $21\frac{9}{11}$ tons.

4. I have 12 bins, each 10 by 5 and 8 ft. deep, full of wheat. How many bu. of wheat have I? ANS.: 3,840 bu.

5. How many gallons in a barrel whose capacity is 6.25 cu. ft.? ANS.: 46.75+gal.

6. How many bu. of wheat in a box containing 750 cu. ft.? ANS.: 600 bu.

7. I have a wagon-bed that holds 135 bu. What are its dimensions if the length is six times its width and 9 times its depth? ANS.: 18 ft. long, 3 ft. wide and 2 ft. deep.

8. A cubical box holds 583.2 bu. What are its dimensions? ANS.: 9 ft.

9. How many bags holding $1\frac{1}{3}$ pk. each can be filled from a bin of wheat which is 10 ft. long, 4 ft. wide and 8 ft. deep? ANS.: 768 bags.

10. What will it cost to build a stone wall 80 ft. long, $2\frac{1}{2}$ ft. thick and 10 ft. high at $1 a perch? ANS.: $\$80\frac{8}{99}$.

11. I paid $\$254.54\frac{6}{11}$ for the cellar wall of my house, 60 ft. by 45 ft. The wall was 8 ft. high and $1\frac{1}{2}$ ft. thick. What did I pay a perch? ANS.: $2.50.

12. What will a log cost that is 20 ft. long and average girt 60 in. at $2\frac{1}{2}$ cts. a cu. ft.? ANS.: 99.5+cts.

13. What is the number of feet of lumber in a stick of timber 20 ft. long, 8 in. wide and 4 in. thick? ANS.: $53\frac{1}{3}$ ft.

14. How many feet in 12 boards 16 ft. long and 15 in. wide? ANS.: 240.

15. What is the largest cube that can be cut from a sphere 30 in. in diameter? ANS.: 17.32+in.

16. A globe 40 in. in diameter, the shell being 1 in. thick, is filled with water. How many gallons are in it? ANS.: 124.37+gal.

17. What will it cost to guild a globe 60 in. in diameter at 2 cts. a square inch? ANS.: $226.195+.

18. If it cost $1005.312 to guild a globe at 5c. a sq. in., what is its diameter? ANS.: 80 in.

19. I paid $226.195 to have a globe 60 in. in diameter gilded. What was the price per sq. in.? ANS.: 2 cts.

20. What will it cost to have a cube whose sides are 2 in. plated with silver at 50 cts. per sq. in.? ANS.: $12.

21. How many cubic ft. in 20 posts 12 ft. long, 6 in. square at one end and 4 by 4 at the other? ANS.: $42\frac{2}{3}$ cu. ft.

22. How many cu. ft. in a log 40 ft. long, 3 ft. in diameter at one end and 2 ft. at the other? ANS.: 198.968+.

23. A water tank in the shape of a frustum of a cone is 15 ft. deep, the lower diameter is 16 ft. and the upper 12 ft. Find the contents. ANS.: 2,324.65+cu. ft.

24. How many cu. ft. in the frustum of a square pyramid of stone 20 ft. high; the side of the upper base is 8 in. and the lower base 20 in? ANS.: $28\frac{8}{9}$ cu. ft.

25. The slant height of the frustum of a square pyramid is 10 ft. The side of the upper base is 20 in. and the lower 30 in. Find the convex surface. ANS.: $83\frac{1}{3}$ sq. ft.

26. I sold a block of marble 20 ft. long and 20 in. square at each end at $2.25 per cu. ft. What did I receive for it? ANS.: $125.

27. The base of a square pyramid is 764 ft. on each side; height 480 ft. What is the solidity? ANS.: 93,391,360 cu. ft.

28. The slant height of a square pyramid is 8 ft. and the sides of the base 5 ft. Find the entire surface. ANS.: 125 sq. ft.

29. If I receive $140.80 for painting an octagonal church spire whose slant height is 80 ft. and the sides of its bases 8 ft., what do I receive a sq. ft.? ANS.: $5\frac{1}{2}$ cts.

30. What will it cost to paint a cone whose slant height is 60 ft. and the circumference of its base 40 ft., at 5 cts. a square foot? ANS.: $60.

31. How many gallons will a cistern hold that is 20 ft. deep and 30 ft. in diameter? ANS.: $105,753\frac{3}{5}$ gal.

32. A log 50 ft. long and 2 ft. thick was sold at 20 cts. a cu. ft. What did it cost? ANS.: $31.41+.

33. I sold a log $2\frac{1}{2}$ ft. in diameter at 10 cents a cu. ft. and received $3.927. What was its length? ANS.: 8 ft.

34. A square stick of timber 60 ft. long at 20 cents a cu. ft. cost $27. How many ft. of inch plank will it make, allowing $\frac{1}{9}$ waste for sawing? ANS.: 1,440 ft.

35. I paid $3.31\frac{1}{4}$ for painting the sides and one end of a rectangular prison 6 ft. high and the sides $2\frac{1}{2}$ ft. each. What did I pay a square foot? ANS.: 5 cts.

36. How large a square can be placed in a circle whose diameter is 3 ft.? ANS.: 25.455+in.

37. A circular island is 14 rds. in diameter. What is the value of the largest inscribed square at $2 per sq. rd.? ANS.: $196.

38. The circumference of a circular pond is one mile. What is its diameter? ANS.: 1,680.67+ft.

39. What is the area of a circular field inclosed by one mile of fence? ANS.: 50 acres 148 perches 188.39+sq. ft.

40. A circular fish pond 100 ft. in diameter was sold at 10 cts. a sq. ft. What did it bring? ANS.: $785.40.

41. A horse tied by a rope grazed over 7854 sq. ft. How long was the rope? ANS.: 50 ft.

42. Two boys in rowing across a stream 620 ft. wide go 800 ft. How far did they drift? ANS.: 505.57+ft.

43. A rope 40 ft. long tied to the top of a house reaches 10 ft. in the street. How high is the house? ANS.: 38.72+ft.

44. What will it cost to paint a steam boiler 30 ft. long and 5 ft. in diameter at 2 cts. a sq. ft., allowing 10 sq. ft. for openings? ANS.: $10.01+.

45. A cistern holds 20 hhds. and is 5 ft. 10 in. in diameter. What is its depth? ANS.: 6 ft. 3.63+in.

46. If a pint of water will fill 15 cone-shaped glasses, how many times will a gallon fill similar glasses of $1\frac{1}{2}$ times the diameter at the top? ANS.: $53\frac{1}{3}$.

47. How many square inches on a school globe 15 in. in diameter? ANS.: 706.86.

48. What is the diameter of a tin pan whose area is 196 sq. in.? ANS.: 15.79+in.

49. The radius of a circle is 11 ft. What is the area? ANS.: 380.133+sq. ft.

50. I paid $76.80 for the flooring of a two-story house 24 x 32 ft. What did I pay for every hundred ft.? ANS.: $5.

51. What will be the cost of 9 boards 13 ft. long, 9 in. wide and $1\frac{1}{2}$ in. thick at $1 a hundred? ANS.: $1.31+.

52. The surface of a globe is 1520.5344 sq. ft. Find the diameter. ANS.: 22 ft.

53. What is the surface of a globe whose circumference is 39.27 in.? ANS.: 490.875 sq. in.

54. The solidity of a sphere is 65.45 cu. in. Find the surface. ANS.: 78.54 sq. in.

55. What is the solidity of a globe whose diameter is $1\frac{1}{2}$ ft.? ANS.: 1 cu. ft. 391.5 cu. in.

56. Over what area can a horse graze, tied by a rope 52 ft. long to the top of a stake 20 ft. high? ANS.: 26.58+sq. rds.

57. Find the curved surface of a right cone whose base is 4 ft. in diameter and slant height 5 ft. ANS.: 31.41+ sq. ft.

58. The sides of a triangle are 10, 10½ and 14½. What is the area? ANS.: 52.5.

59. The base of a triangle is 136, altitude 17. What is the side of a square equal in area? ANS.: 34.

60. How much paper 2 ft. wide will it take to cover the walls of a room 16 ft. long, 14 ft. wide and 8 ft. high? ANS.: 80 yds.

61. My cistern is 5½ ft. deep and 6 ft. in diameter at the top and 6 ft. at the bottom. How many barrels will it hold? ANS.: 35.25+bbls.

NOTE.—The answers to a few of the above problems, such as finding the capacity of wagon beds, etc., are only approximately correct.

MISCELLANEOUS.

1. A tree 100 ft. high was broken by the wind so that the top reached the ground 30 ft. from the stump. How high is the stump? ANS.: 45½ ft.

2. What is the least number of squares of the greatest possible size contained in a field 40 by 30 rds.? ANS.: 12.

3. If the diameter of a ball whose volume is 27 cu. in. is 3 in., what is the diameter of a ball whose volume is 343 cu. in.? ANS.: 7 in.

4. A grocer at one straight cut took off a segment of cheese which had ¼ of the circumference and weighed 3 lbs. What is the weight of the whole cheese? ANS.: 33.02 +lbs.

5. If a pipe $1\frac{1}{2}$ in. in diameter fill a cistern in 5 hrs., in what time will a pipe 3 in. in diameter fill the same cistern? ANS.: $1\frac{1}{4}$ hrs.

6. Three poles, each 50 ft. long, are tied together at the top and stand 60 ft. apart at the base; what is the distance from the apex to the ground? ANS.: 38.73+ft.

7. The diagonal of a field in the shape of a parallelogram containing 30 acres is 100 rds. Find the sides. ANS.: 80 and 60 rds.

8. The base of a triangle is 9 in. What will be the length of a line drawn parallel with the base so as to divide it into two equal parts? ANS.: 6.36+in.

9. What integer multiplied by the next greater gives 1,332? ANS.: 36.

10. What integer is that whose square root is 5 times its cube root? ANS.: 15,625.

11. What is the side of a square field whose diagonal is 10 rods longer than its side? ANS.: 24.14+rds.

12. How much square edged inch lumber can be cut from a log 32 in. in diameter and 20 ft. long? ANS.: 980 ft.

13. The side of a square field containing 18 acres is 53.6+rds. What is the side of a similar field that contains $\frac{1}{3}$ as much? ANS.: 30.9+rds.

14. What is the side of the largest cube that can be cut from a globe 36 in. in diameter? ANS.: 20+in.

15. How much wheat will a cubical box hold whose diagonal is 12 ft.? ANS.: 266+bu.

16. The perpendicular and base of a right-angled triangle are equal and its area is 8 acres. What is the hypotenuse? ANS.: 71.5+rd.

17. The base of a triangle is 136, the altitude 17. Find the side of a square equal in area. ANS.: 34.

18. Two poles are of equal length. When one is placed upright and the other is leaning against it, their tops are 4 ft. asunder and their feet are 16 ft. apart. What is the length of each? ANS.: 34 ft.

19. A board $1\frac{1}{2}$ inches thick contains $49\frac{5}{8}$ sq. ft. What is the side of the largest cubical box that can be made from it? ANS.: 36 in.

20. How many acres in an equilateral triangle each side of which is one furlong in length? ANS.: 4.33+A.

21. If the diameter of the greater of two concentric circles be 30 ft., and that of the smaller 20, what is the area of the space between them? ANS.: 392.7+sq. ft.

22. The length of a field containing 4 A. is 12 rds. longer than its side. What is the length and breadth? ANS.: 20 and 32 rd.

23. It is required to inclose a piece of ground with a fence 10 rails high, 2 panels to the rod, and to have just as many acres inclosed as there are rails in the fence. How many acres in the field, the field being square? ANS.: 1,024,000 A.

24. How many square inches of leather will cover a ball $3\frac{1}{2}$ in. in diameter? ANS.: 38.4+sq. in.

25. A man was hired 50 days on condition that for every day he worked he should receive 75c., and should pay 25c. for every day he was idle. On settlement he received $27.50; how many days was he idle? ANS.: 10.

26. Divide 120 apples among 3 boys, and as often as the first shall receive 3, give the second 5, and the third 7; what will be the share of each? ANS.: 24, 40 and 56.

27. Three men bought a grindstone 30 in. in diameter, each paying the same. They grind off their shares successively. Find the thickness of each man's share. No aperture. ANS.: 1st, 2.75+; 2d, 3.59+; 3d, 8.65+.

28. A circuit is 20 miles in circumference. A goes 2 miles an hr., B 4, and C 6; they start at the same point; how long will it be before they meet? ANS.: 10 hrs.

29. $\frac{1}{3}$ the number of dollars in a purse exceeds $\frac{1}{4}$ by 20; what does the purse contain? ANS.: $240.

30. The head of a fish is 10 in. long, its tail is as long as its head and $\frac{1}{2}$ the body, and the body as long as the head and tail both. How long is the fish? ANS.: 80 in.

31. A and B together can do a piece of work in 18 days. A alone can do it in 30 days; in what time could B do it alone? ANS.: 45 days.

32. Suppose the radius of the earth is 4,000 miles; what would a 20 lb. ball weigh 3 miles from the surface of the earth? ANS.: 19.97+lbs.

33. In what time will a leaden ball drop from a steeple 484 feet high? ANS.: $5\frac{1}{2}$ seconds.

34. A ball discharged directly upwards returns to the earth in 12 seconds; how high did it ascend? ANS.: 576 ft.

35. A stone let fall reaches the bottom of a well in 2 seconds; how deep is the well? ANS.: 64 ft.

36. If a scaffold 20 ft. square holds 50 bu. of fruit, how many bu. will one 30 ft. square hold? ANS.: $112\frac{1}{2}$ bu.

37. What is the diameter of each of the 3 largest equal circles that can be inscribed in a circular farm containing 500 acres? ANS.: 148.1+rds.

38. If cloth for a suit of clothes for a man weighing 125 lbs. cost $10, what will it cost to make a suit for a man weighing 216 lbs.? ANS.: $14.40.

39. I am 45 yrs. of age. How many yrs. old would I be if I had lived the same length of absolute time on the planet Mercury? On Jupiter? ANS.: Mercury 186.8 yrs. old; Jupiter .53 or a little past $\frac{1}{2}$ yr. old.

40. A and B shot by turns at a target; A put 7 balls out of 12 in the center, and B 3 out of 4, and between them they put in 32 balls. How many shots did each fire? ANS.: 24.

41. From the middle of the side of a square 10-acre field a line is run cutting off $1\frac{7}{8}$ acres. What is the length of the line? ANS.: 36+rods.

42. A tube $\frac{3}{4}$ in. in diameter will empty a cistern in 50 min. In what time will it empty it when another pipe $\frac{1}{3}$ of an inch in diameter is running into it? ANS.: $62\frac{4}{13}$ min.

43. Three equal circles touch each other externally, thus inclosing one acre. What is the diameter of each circle? ANS.: 63+rds.

44. What are the sides of a right-angled triangle having the least hypotenuse in which, if a square be inscribed, its side will be 12? ANS.: 24.

45. If the arch line of a sector measures 5 ft. and the radius 4 ft., what will be the area? ANS.: 10 ft.

46. I bought a 6 per cent. $2,500 mortgage at 5 per cent. discount, with two yrs. to run; prove that I get $8\frac{1}{19}$ per cent. interest on the money invested, the mortgage being satisfied at maturity.

47. Required the number of acres in a field whose length is to its breadth as 4 : 5, having a fence around it 7 rails high, two panels to the rod, and just as many rails as acres. ANS.: 508,032.

48. The perpendicular of a right-angled triangle is 36 ft., and the sum of the other sides is 108 ft. Find them. ANS.: Base, 48 ft.; hypotenuse, 60 ft.

49. A square field has an area of 10,000 sq. yds. What is the breadth of a walk around it, that the area of the walk is $\frac{9}{16}$ of the area of that part within the walks? ANS.: 10 yds.

50. Two ladders are standing in a street with their bases 20 ft. apart, inclined toward each other, at an angle of 45 degrees until their tops intersect. What is their length? ANS.: 14.14+ft.

51. A cube of lead whose side was 4 inches was evenly plated with 61 cu. in. of silver; how thick was the plating? ANS.: $\frac{1}{2}$ inch.

52. A bicycle wheel makes $840\frac{1}{3}$ revolutions to the mile; what is the height of the wheel? ANS.: 2 ft.

53. A tower is 195 ft. high and 10 ft. in diameter at the top. To a man whose eye is 5 ft. above the center of the top of the tower, what area of the street will be hid? ANS.: 502,656 sq. ft.

54. How much inch rope will be required to go round a stovepipe 1 ft. in diameter so that the outer edges will meet? ANS.: 43.98+in.

55. Mt. St. Elias is 19,283 feet high. At what distance on the Pacific Ocean may its top be seen? ANS.: 169.9+miles.

56. A rectangular piece of ground containing ½ an acre is 5 times as long as it is broad. What is the length and breadth? ANS.: 4 and 20 rods.

57. A had hired for a year at $168 and 5 cords of wood; he left in 7½ months and received $98 and the wood. What was the wood worth per cord? ANS.: $1.40.

58. How much gold 90% pure must be mixed with 24 oz. 65% pure to make the mixture 80% pure? ANS.: 36 oz.

59. Yesterday at noon my longitude was 16° 18′ west. To-day the sun came on the meridian at 11 o'clock and 36 min. What is my longitude? ANS.: 10° 18′ west.

60. I have a mirror 12 by 36 in., and its frame of uniform width contains 448 sq. in. How wide is the frame? ANS.: 4 in.

61. A ladder placed 8 feet from a wall just reaches the top of the building 40 ft. high. How far must it be placed from the wall to reach a point 10 ft. from the top? ANS.: 27.64+ft.

62. A room in the shape of a cube measures 20 ft. on each side. How far is it from each upper corner to the center of the floor? ANS.: 24.49+ft.

63. A square field is of such size that if silver dollars 1½ in. in diameter are laid around the boundary so they will touch each other they will pay for the land at $40 per acre. How many acres in the field? ANS.: 27,878⅔ acres.

64. A rifle ball fired perpendicular in the air returned to the ground in 16 sec. How far did it go? ANS.: 1,024 ft.

65. There is a park 16 rods square. I make a path around the edge containing $\frac{15}{64}$ of the area of the park. How wide is the path? ANS.: 1 rod.

66. A man weighs 160 lbs. av. What will he weigh troy? ANS.: 194+lbs.

67. A fence 5 boards high, each board 6 in. wide, is built around a 10-acre square field. What is the lumber worth at $8 per M? ANS.: $52.80.

68. A regular octagon has a perimeter 96 ft., and the distance from the center to the middle of each side is 12 ft. Find the area. ANS: 576 sq. ft.

69. What is a field worth in the shape of a triangle and the sides in proportion, as 6, 8 and 10, the shorter side being 12 rds., at $850 per acre? ANS.: $510.

70. A boat can go 15 mi. per hr. down stream and 10 miles per hr. up stream. How far can it go and return in 4 hours? ANS.: 24 miles.

71. How much more water will a tile 6 in. in diameter discharge per hr. than one 4 in.? ANS.: $2\frac{1}{4}$ times.

72. A, B and C dine on 6 pies. A furnishes 4 and B 2. C pays 10 cents for his dinner. How shall A and B divide the money? ANS.: A gets 10 cts.

73. What is the diameter of a sphere whose volume is equal to a cone whose base is 1 ft. in diameter and altitude 2 ft.? ANS.: 1 ft.

74. How many bu. of coal will a cart hold that is $9\frac{1}{2}$ ft. long, $3\frac{1}{2}$ ft. wide, 13 in. deep? ANS.: 24+bu.

75. How long will it take $50 to amount to $72.50 at $8\frac{1}{2}\%$? ANS.: 5 yrs. 3 mo. 16 da.

76. If the time past noon plus $1\frac{1}{2}$ hrs. is $\frac{5}{11}$ of the time from noon to midnight, what is the hour? ANS.: $3\frac{1}{2}$ o'clock P. M.

77. If a cistern 5 ft. in diameter and 10 ft. deep holds 500 bbls., how many bbls. will a cistern 10 ft. in diameter and 20 ft. deep hold? ANS.: 4,000 bbls.

78. How many feet of lumber in a stick of timber 18 in. square at one end, 6 in. square at the other and 20 ft. long? ANS.: 260 ft.

79. How much lumber in a pole 20 ft. long and 10 and 5 in. in diameter respectively? ANS.: 7.7+sq. ft.

80. If a man 5 ft. high weigh 120 lbs., what will a man 6 ft. high weigh? ANS.: 207+lbs.

81. If a piece of gold weigh 9 oz. in the air and $8\frac{1}{2}$ oz. in the water, what is its specific gravity? ANS.: 18.

82. A cube has an area of 5,400 sq. in. What is its solid contents? ANS.: 27,000 cu. in.

83. I can pasture 12 horses or 15 cows. How many horses can I keep if I have 10 cows? ANS.: 4.

84. A can do a piece of work in 80 days, B in 40 days; both together work 12 days, then B quits but returns in time for them to complete the work in 40 days. When did B return? ANS.: End of 32d day.

85. The extreme point of a minute hand of a clock moves 30 in. in 12 minutes. How long is the hand? ANS.: 23+in.

86. A man hired for 80 days at $3 per day; he spent $1 every day he was idle; at the end of that time he had $150. How many days did he work? ANS.: $57\frac{1}{2}$.

87. A cistern 5 ft. in diameter holds 100 bbls. of water. What will one of the same depth and $12\frac{1}{2}$ ft. in diameter hold? ANS.: 625 bbls.

88. A pyramid is 10 ft. square at the base and 20 ft. high. How far from the base must it be divided parallel to the base to make two equal parts? ANS.: 4.2—ft.

89. If a hay stack 20 ft. high contains 10 tons, what will a similar one 10 ft. high contain? ANS.: $1\frac{1}{4}$ tons.

90. Find the length of an hour hand of a clock whose extreme point moves 2 in. in 15 minutes. ANS.: 15+in.

91. Two men carry a hog weighing 200 lbs. with a stick 6 ft. long. What weight does each sustain if it is 6 in. from the center of the stick? ANS.: $83\frac{1}{3}$ and $116\frac{2}{3}$ lbs.

92. A, B and C buy a grindstone 3 ft. in diameter for $5.00. A pays $2, B $1.75, C $1.25. How much must each grind off to get his deserved share? A grinds first, B second and C last. ANS.: A, 406+; B, 355+; C, 254+sq. in.

93. How much water must be mixed with vinegar worth 40 cts. a gal. to make 50 gal. of the mixture worth 25 cts. a gal.? ANS.: $18\frac{3}{4}$ gal.

94. If a cu. ft. of iron was made into a bar $\frac{1}{4}$ in. square, what would be its length? ANS.: 2,304 ft.

95. Find the sides of a rectangular field containing 200 acres, one side being 40 rods longer than the adjacent side. ANS.: 160 and 200 rds.

96. Find the cost of a fence at $3 per rd. that will enclose a square field of 20 acres. ANS.: $678.

97. How many sq. yds. of canvas will be required to make a tent, diameter 24 ft. and height of the center pole 32 ft.? ANS.: 142.8+sq. yds.

98. The diagonal of a rectangular field containing $7\frac{1}{2}$ acres is 50 rds. Find the sides. ANS.: 30 and 40 rds.

99. Three women own a ball of yarn 10 in. in diameter. Find what each will wind off to share equally. ANS.: 1st, 1.3+; 2d, 3.2+; and 3d, 5.5+in.

100. A teacher hired on conditions if he had 40 pupils, he was to get $40 per mo.; if he had 28, he was to get $35 per mo. It so happened he had 35 pupils. What should he receive? ANS.: $\$38.64\frac{7}{11}$.

101. How much water will a bucket hold whose upper diameter is 13 in., its lower diameter $8\frac{1}{2}$ in. and its height $8\frac{1}{2}$ in.? ANS.: 3 gal. 1 qt. 1—pt.

102. A has two horses and a cow. The first horse is worth $60. The first horse and cow together are worth $\frac{5}{4}$ as much as the second horse, and the second horse and cow are worth twice as much as the first horse. What is the value of each? ANS.: Cow, $40; horse, $80.

103. Ten years ago I was $\frac{1}{3}$ as old as my father, but two years hence I will be $\frac{1}{2}$ as old. What are our ages? ANS.: 22 and 46 yrs.

104. Two men engaged to build a barn for $540. The first worked $\frac{3}{4}$ as many days as the second, plus 40, and received $300. How many days did each work? ANS.: 1st, 100; 2d, 80.

105. The head of a fish weighs one pound, the tail weighs as much as the head, plus $\frac{1}{4}$ the body, and the body weighs twice as much as the head and tail both. What is the weight of the fish? ANS.: 12 lbs.

106. A pole 134 ft. long stands on a bluff; 16 times the length in the ground plus 6 feet equals $\frac{1}{3}$ of the length in the air increased by 80 ft. How much is in the air? ANS.: 130 ft.

107. A pile of wheat in the corner of a rectangular room forms a portion of a cone; the pile is 6 ft. high and it is 5 ft. from edge of the pile to corner of the room. What is the wheat worth at $1 per bu.? ANS.: $31.55+.

108. The amount of my money for 6 yrs. at 6% is $300 more than the amount of it for 3 yrs. at 10%. How much have I? ANS.: $5,000.

109. A debt with interest at 6% was paid Aug. 18, 1893; if it had been paid May 12, 1895, there would have been due $26 more. What was the debt at first? ANS.: $250.

110. The 3d term of a geometric series is 507; the first term 3. Find the ratio. ANS: 13.

111. It is 2 mins. after 2 o'clock P. M., 2′ 30″ east long. What is the time 31° 27′ 30″ west long.? ANS.: 56 min. after 11 A. M.

112. How many pens must I buy for $1 so that I may gain 20% by selling them 4 for 1 cent? ANS.: 480.

113. The present worth of a debt at 6% is $660, which is $213.40 less than the debt. How long before the debt is due? ANS.: 5 yrs. 4 mos. 20 days.

114. At what time between 5 and 6 o'clock is the min. hand 14 mins. behind the hour hand? ANS.: 12 mins. after 5.

115. What number is that whose square is $22\frac{2}{9}\%$ of the cube of 8? ANS.: $10\frac{2}{3}$.

116. I saved $7.25 interest by paying off a note 20 days before due. Find the face, int. 6%. ANS.: $2,000.

117. At his marriage B agrees that if, at his death, he leaves only a daughter, his wife shall have $\frac{3}{4}$ of his money, and if he should leave only a son, she should have $\frac{1}{4}$; he left a son and daughter. What did each one receive if he left $6,591? ANS.: Son, $4.563; widow, $1.521; daughter, $507.

118. What is the greatest number that will divide 27, 48, 90, and 174, and leave the same remainder? ANS.: 21.

119. A, B and C pasture an equal number of horses on a field, of which A owns 9 acres, and B 15 acres; if C pays $24 for his pasturage, how much should A and B receive? ANS.: A, $3; B, $21.

120. A, in buying coffee, found, if he paid 11 cts. per pound, he would lack 30 cts. of having money enough to pay for it; he bought at $10\frac{1}{2}$ cts. and had 15 cts. left. How many pounds did he buy? ANS.: 90 lbs.

121. A bought at one time 5 pears and 6 peaches for 28 cts., and at another time, 6 pears and 3 peaches for 21 cts. What was the cost of each kind of fruit? ANS.: Pears, 2 cts.; peaches, 3 cts.

122. A company of 10 hire a team. Two fail to come but four others join the company, thus reducing the estimated expense to each by 50 cents. What does each pay and what does the team cost? ANS.: $1.25 and $15.

123. If 40 cats kill 40 rats in 40 mins., how many cats can kill 10 rats in 10 mins.? ANS.: 40.

124. The ages of A, B and C are to each other as 3, 4 and 5, and their sum is 136 yrs. What is the age of each? ANS.: A, 34; B, $45\frac{1}{3}$; C, $56\frac{2}{3}$.

125. A and B were partners; A put in $4,500 and received $\frac{3}{5}$ of the profits. What was B's capital? ANS.: $3,000.

126. What number multiplied by $\frac{3}{11}$ of itself will give 1,188? ANS.: 66.

127. A teacher hired on condition that if he had 20 pupils he was to receive $20 per mo., and if he had 12 pupils he was to receive $15 per mo.; but he had 17 pupils. What should he receive? ANS.: $18.59\frac{3}{8}$.

128. A piece of cheese weighs 4 lbs. in one side of a pair of scales and 9 lbs. on the other side. What is the true weight of the cheese? ANS.: 6 lbs.

129. The interest on $\frac{1}{2}$ of A's plus $\frac{2}{3}$ of B's money for a certain time, at 2%, was to *this sum* as 9:250, and *this interest* for 25 times as long, at 10 times as great a % was $180. What was their money, if A's money was to B's as 1:3? ANS.: A, $200; B, $600.

130. What is the diameter of the largest circle that can be inscribed in an equilateral triangle whose sides are 15? ANS.: 8.6+.

131. If the hands of a clock were 3 and 4 ins. long, how far apart would the points be at 3 o'clock? ANS.: 5 ins.

132. Find the side of a square lot equal in area to a circular one 60 rds. in diameter. ANS.: 53.1+rds.

133. What is the diameter of a round field of such size that every 6 ft. of fence is equal to $\frac{1}{2}$ acre? ANS.: 7,260 ft.

134. The area of an equilateral triangle is 173.2 ft. What are the sides? ANS.: 18.61+ft.

135. The axes of an ellipse are as 2:3 and its area is 125 sq. ft. Find the diameters. ANS.: 10 and 15 ft.

136. The strength of two men are as 3:4; where must a weight be placed on a spike $3\frac{1}{2}$ ft. long, so that they may carry in proportion to their strength? ANS.: $1\frac{1}{2}$ ft. from stronger man.

137. A newsboy buys papers at 20 cts. per dozen, and sells them at a nickel apiece. Find his per cent. of profit. ANS.: 200%.

138. What % of .005 is $100? ANS.: 2,000,000%.

139. A and B's hotel bill was $3; A pays $\frac{1}{3}$ more than B. What did each pay? ANS.: A, $1\frac{5}{7}$; B, $1\frac{2}{7}$.

140. A board is 18 ft. long, 18 inches wide at one end and 6 ins. at the other. How far from the larger end must I cut it across to divide it equally? ANS.: 6.5+ft.

141. How much lumber in a board 12 ft. long and one inch thick by 12 ins. wide at one end and 2 ins. square at the other? ANS.: $9\frac{3}{8}$ ft.

142. How many posts 7 ft. apart will it take to fence a lot containing 70,756 sq. ft., the length of the fence being 4 times the width? ANS.: 190.

143. What is the mean proportional of 9 and 16? ANS.: 12.

144. Find the side of the largest square that can be inscribed in a right angled triangle whose base is 16 ft. and perpendicular 12 ft. ANS.: 6.8+ft.

145. What is the diameter of the largest cylinder that can be cut out of a globe 30 ft. in diameter? ANS.: 24.5+ft.

146. What is the solidity of a cubical box that will hold 625 lbs. of water? ANS.: 10 cu. ft.

147. What is the diameter of the largest circle that can be inscribed in a right angled triangle whose base is 8 and perpendicular 6 ft.? ANS.: 4 ft.

148. $\frac{2}{3}$ of A's money added to $\frac{3}{4}$ of B's, which is 3 times $\frac{2}{3}$ of C's, being put on interest for 8 yrs. at 5% gives $800 interest. How much money have they all? ANS.: $2,000.

149. A building whose height is 18 ft. to the square is 25 ft. wide, and the rafters on one side are 15 ft. and on the other 20 ft. What is the height of the house? ANS.: 30 ft.

150. A piece of ground whose 3 sides are equal cost $375 at the rate of $75 per acre. How many rods of fence are required to inclose it? ANS.: 120 rods.

151. What time between 5 and 6 o'clock will the hour hand be midway between the minute hand and the figure 5? ANS.: Half past 5.

152. How many acres in a rectangular field whose sides are as 2 to 3, if the number of acres in the field just equals the number of panels in the fence inclosing it, the panels being 10 ft. long? ANS.: 7,260.

153. I find my watch, which keeps correct time, is 3 hrs. slow. How far and in what direction did I travel? ANS.: East 45°.

154. A street 200 feet wide has a wall on one side 100 ft. high and 80 ft. high on the other side; find the length of the shortest line that will reach from the top of one wall down to the middle of the street and then to the top of the other wall. ANS.: 269+ft.

155. $1,400 is left to two children, whose ages are 11 and 16. I want to invest it at 10% so that each will have the same when he is of age. How shall I divide it? ANS.: $600 and $800.

156. A rectangular field contains $10\frac{4}{5}$ acres and the sum of its sides is 168 rds. Find the sides. ANS.: 36 and 48 rds.

157. A wheel 4 ft. in diameter stands one ft. in water; what fraction of the wheel is in the water? ANS.: .195+.

158. If a man can plant a field 100 rds. in diameter in 4 days, how long will it take him to plant one 200 rds. in diameter? ANS.: 16 da.

159. Two wheels, one 6 ft. in diameter and the other 4 ft., are on an axle 12 ft. long, and are started to roll. How large a circle will they inclose? ANS.: 72 ft. diameter.

160. Find the diameter of the 3 largest circles that can be inscribed in a circle whose circumference is 128 ft. ANS.: 18+ft.

161. A lot lies between two parallel roads $\frac{1}{2}$ mile apart; it is 90 rds. on one road and 75 rds. on the other. What is the lot worth at $80 an acre? ANS.: $6,600.

162. I have a circular piece of land 5 rds. in diameter, from which I take enough earth to fill a cone whose base is 10 ft. in diameter and 15 ft. deep. How much was the lot lowered? ANS.: .0734+ft.

163. Find the solidity of an octahedron whose linear side is 6 in. ANS.: 101.82+cu. in.

164. What debt can be discharged in 12 days by daily payments which are in geometrical progression, the second payment being 3 cents and ratio being 8? ANS.: $36,814,005.39.

165. The length of the hypotenuse is 10 ft., the sum of the base and altitude 14 ft. What is the base and altitude? ANS.: Base, 6 ft.; alt., 8 ft.

166. How much will I make by borrowing money at 5% to pay a debt of $6,400, due in 8 mos., allowing the present worth of this debt to be reckoned by deducting 5% per annum discount? ANS.: $7.11+.

167. B wishes to divide $290 between his two sons A and D, whose ages are respectively 15 and 19 yrs., in such a manner that the parts bearing simple interest at 10% shall amount to such sums, when they are 21 yrs. of age, that $\frac{2}{3}$ of A's money shall be equal to $\frac{2}{5}$ of D's. ANS.: A's, $90; D's, $200.

168. B owns a piece of land 320 rds. long and 180 rds. wide, and wishes to lay it off into the smallest practicable number of square fields. What will be the number of fields and what is their size? ANS.: 144 fields 20 rds. square.

169. How far will a heavy ball fall in 20 seconds? ANS.: 6,400 ft.

170. What is the diameter of each of the four largest circles that can be inscribed in a larger circle whose radius is 10 ft.? ANS.: 4.14+ft.

171. A body falls $904\frac{11}{16}$ ft. in $7\frac{1}{2}$ seconds. How far does it fall the first second? ANS.: $16\frac{1}{12}$ ft.

172. Find the difference between two numbers whose sum is 12 and their product 35? ANS.: 2.

173. The sum of two numbers is 16 and their difference is 2. Find the numbers. ANS.: 7 and 9.

174. The difference between two numbers is 3, and their product 180. What are the numbers? ANS.: 12 and 15.

175. The sum of two numbers is 7 and the sum of their cubes 133. Find the numbers. ANS.: 2 and 5.

176. The diameter of each of four equal circles that can be inscribed in a larger circle is 4 ft. What is the diameter of the larger circle? ANS.: 19.31+ft.

177. The sum of the squares of two numbers is 41 and the difference of their squares 9. What are the numbers? ANS.: 4 and 5.

178. The sum of two numbers is 19 and the sum of their squares 193. Find the numbers. ANS.: 7 and 12.

179. The difference of two numbers is 7 and the sum of their squares 65. Find the numbers. ANS.: 8 and 1.

180. Suppose there be a round pole 20 ft. high and 1 ft. in diameter and a vine entwines itself around it just 12 times at equal distances from bottom to the top. What is the length of the vine? ANS.: 42.79+ft.

181. A boy hired on conditions for 12 weeks, that he should receive $12 and a coat. At the end of 7 weeks the parties separated, and it was found that the boy was entitled to $5 and the coat. What was the value of the coat? ANS.: $4.80.

182. A globe 6 in. in diameter weighs 25 lbs. What is the weight of another of like metal 3 in. in diameter? ANS.: 3.12+lbs.

183. The sides of two square pieces of ground are as 3 to 5, and the sum of their areas is 30,600 square feet. What is the side of each piece? ANS.: 90 and 150 ft.

184. B gives $1,200 to C to be invested in trade for one year, on condition that if C add $500 to it and act as manager he shall have $\frac{2}{5}$ of the gain. What was C's time worth? ANS.: $300.

185. A has 4 sons, whose ages differ from each other 4 yrs. and the youngest is half as old as the oldest. Find the age of each. ANS.: 12, 16, 20 and 24 yrs.

186. A and B together have 60 sheep, and if you divide what A has by what B has the quotient will be 3. Required the number each has. ANS.: A, 45; B, 15.

187. A owns 720, B 336 and C 1,736 rods of land. They agree to divide it into equal lots, fixing on the greatest number of rods for a lot that will allow each owner to lay out all his land. How many sq. rods must there be in a lot? ANS.: 64.

188. It is required to find a sum of money of which, in the space of 4 yrs., the true discount at simple interest is $5 more at the rate of 6% than at 4% per annum. ANS.: $89.90.

189. If a railroad carry 4,500 pounds 1,800 miles for $27, how far can 3,000 pounds be carried for $11? ANS.: 1,100 mi.

190. An equilateral triangle whose sides are 8 is inscribed in a circle. What is the circumference of the circle? ANS.: 28.99+.

191. How many acres in a field in the shape of a parallelogram whose diagonal is 100 rods and the difference of the squares of the sides is 2,800? ANS.: 30 acres.

192. The difference in the sides of a grass plot is 9, and of their squares 135. Find the sides. ANS.: 12 and 3.

193. The diameter of 3 equal circles touching each other is 10 ft. What is the inclosed space? ANS.: 4.03+sq. ft.

194. The altitude of a field in the shape of an equilateral triangle is 60 rds. What will it cost to fence the field at 80 cts. per rod? ANS.: $166.17+.

195. How many acres in a square field whose diagonal is 24 rods longer than its side? ANS.: 20.9+.

196. The area of a parallelogram is 140 square rods., and it is inclosed with 48 rods of fence. What are its dimensions? ANS.: 14 and 10 rds.

197. A garden is 4 rods longer than it is wide and contains 140 square rods of ground. What are its dimensions? ANS.: 14 and 10 rds.

198. A parallelogram is 6 rods longer than it is wide, and its diagonal is 30 rds. How many rods does it contain? ANS.: 432 rds.

199. A gentleman told a lady that his age was 25, intimating that he would be glad to know how much he was her senior. The lady replied: "The square root of the product of yours by mine is equal to 4 times the square root of your own." What was the age of the lady? ANS.: 16.

200. Says Charlotte to her brother, Mr. S. has lived as long as both Jane and I together, and if his age be multiplied by mine the product would be 420; but if my age and hers be multiplied the product is only 224. What are the ages of the young ladies? ANS.: Charlotte, 14; Jane, 16.

201. Three men are to carry a stick of timber of uniform size 10 ft. long, two at the spike and one at the end of the stick. How far from the center of the stick must the spike be placed so that each may carry equal weight? ANS.: $2\frac{1}{2}$ ft.

202. What is the diameter of each of 7 the largest circles that can be inscribed in a larger one 15 ft. in diameter? ANS.: 5 ft.

203. A stick of timber 20 ft. long and of uniform size is to be carried by 4 men and one boy, the boy equal to $\frac{1}{2}$ of a man, the men at the spike and the boy at the end. How far from the center of the stick must the spike be placed? ANS.: $1\frac{1}{4}$ ft.

204. If a board 18 in. wide at one end and 6 in. wide at the other and 12 ft. long be divided into 3 equal pieces, how far from the wide end must each division be made? ANS.: 2.6 and 5.7 ft.

205. A ball 10 in. in diameter is put into a cubical box, each side of which is 10 in. What will be the diameter of each of the four largest balls that can be placed in the four corners? ANS.: 2.68+in.

206. How many feet of lumber in a stick of timber 2 x 4 ft. at one end and 1 x 6 at the other, and 12 ft. long? ANS.: 80.

207. A piece of land is 17 rds. wide at one end and 7 rds. at the other and 60 rds. long. How far from the larger end must it be cut straight across so that the area of the two parts shall be equal? ANS.: 24 rds.

208. A stick of timber of uniform size and 20 ft. long is to be carried by one man and 4 boys, the boys' strength each being equal to $\frac{3}{4}$ of a man. How far from the center must a spike be placed so that each may carry the same, the man being at the end and the boys at the spike? ANS.: $3\frac{1}{3}$ ft.

209. What is the diameter of each of the four largest circles that can be inscribed in an equilateral triangle whose sides are 24 inches? ANS.: 6.9+ft.

210. What will 10 yds. of cloth cost at $\$1.00\frac{03}{3}$ per yard? ANS.: $\$10.001$.

211. If a man weigh 300 lbs. on the earth, what will he weigh on the moon? ANS.: 50 lbs.

212. The hypotenuse is 74 ft. and the base and perpendicular are equal. How long is the base? ANS.: 52.3+ft.

213. What number divided by 6, 7, 8, 9, 10 and 12 will always leave 5 for a remainder? ANS.: 2,525.

214. The sides of a field are as 3 : 4 and diagonal 60 rds. What are the sides? ANS.: 36 and 48 rds.

215. The area of a garden is 3 acres and its boundary 104 rds. What are the sides? ANS.: 40 and 12 rds.

216. If a log 2 ft. in diameter will make 300 ft. of lumber, what will one of the same length and 4 ft. in diameter make? ANS.: 1,200 ft.

217. A stone fell into a cistern 10 ft. in diameter and the water in the cistern rose 6 in. What is the content of the stone? ANS.: 39.27 cu. ft.

218. The solidity of a cone is 56 cu. ft., and the diameter of the base 3 ft. Find the altitude of the cone. ANS.: 23.76+ft.

219. Find the solidity of a prolate spheroid whose polar diameter is 20 and equatorial diameter 15 ft. ANS.: 2,806+cu. ft. approximately.

220. How many acres in an equilateral triangular field of such size that the number of acres in the field will equal the number of panels in the fence surrounding it, the panels being straight and 12 ft. long? ANS.: 7,071+.

221. A, B and C live at the corners of a triangular field; from A to B is 100 rds.; from B to C 80 rds., and from C to A 120 rds. They want to dig a well that shall be the same distance from each. How far from each to the well? ANS.: 60.52+rds.

222. What is the side of the largest square that can be inscribed in an equilateral triangle whose sides are 12 in.? ANS.: 5.56+in.

223. What is the side of the largest square that can be inscribed in a right angle triangle whose sides are 6, 8 and 10 in.? ANS.: $3\frac{3}{7}$+in.

224. What is the diameter of the largest circle that can be inscribed in a right angled triangle whose sides are 12, 16 and 20? ANS.: 8.

225. What is the diameter of the largest circle that can be inscribed in an isosceles triangle whose base is 9 ft. and equal sides 20 ft. 6 in.? ANS.: 7.2+ft.

226. At what figure must Tennessee 5's be bought to give the buyer $5\frac{10}{23}\%$ on his investment? ANS.: 92%.

227. What is the area of the largest square that can be inscribed in a semi-circle, the diameter of the circle being 20 in.? ANS.: 80 sq. in.

228. Two similar fields together contain 518 square rods. What is the area of each if their like sides are as 5 to 7? ANS.: 175 and 343 sq. rds.

229. A wheel on a locomotive is 5 ft. in diameter, and a fly rides on the rim of the wheel. How far does the fly travel while the locomotive runs 10 miles? ANS.: 15.9 +miles.

FRACTIONS.

(1) To cut each piece once=50 cts.
To cut each piece twice=$1.00, ANS.

(2) $\frac{1}{4}-\frac{1}{5}=\frac{1}{20}$; $\frac{1}{20}=1$; $\frac{20}{20}=20$; $20=\frac{1}{4}$ of less; $\frac{4}{4}=80$ less.
$20-1=19$; $19=\frac{1}{5}$ of larger; $\frac{5}{5}=95$ larger, ANS.

(3) $\frac{9}{9}-\frac{8}{9}=\frac{1}{9}$; $\frac{1}{9}=28$; $\frac{9}{9}=252$ larger, $\frac{8}{9}$ of $252=224$ smaller, ANS.

(4) $\frac{1}{4}-\frac{1}{5}=\frac{1}{20}$; $\frac{1}{20}=3$; $\frac{20}{20}=60$, ANS.

(5) $\frac{1}{6}+\frac{1}{9}=\frac{5}{18}$; $\frac{5}{18}=15$; $\frac{1}{18}=3$; $\frac{18}{18}=54$, ANS.

(6) $\frac{5}{5}=$A; $\frac{2}{5}=$B; $\frac{7}{9}$ of $\frac{2}{5}=\frac{14}{45}$ C; $\frac{5}{5}+\frac{2}{5}+\frac{14}{45}=\frac{77}{45}$.
$\frac{77}{45}=\$770$; $\frac{1}{45}=\$10$; $\frac{45}{45}=\$450$ A.
$\frac{2}{5}$ of $450=$180 B; $\frac{7}{9}$ of $180=$140 C, ANS.

(7) $\frac{3}{3}=$length; $\frac{3}{3}-\frac{2}{3}=\frac{1}{3}$; $\frac{1}{3}=6$; $\frac{3}{3}=18$ ft. length.
$\frac{2}{3}$ of 18=12 ft. breadth, ANS.

(8) 1 time A's—120=$\frac{1}{3}$ B's; 3 (A's—120) or 3A's—360=B's; also C's=2 B's or 2 (3A's—360)=6A's—720. 1A's+3 A's—360+6A's—720=6450. 10 times A's=6450+360+720=7530 A's=753; B's=(753—120)×3=1899. 1899×2 =3798 C's, ANS.

(9) $\frac{1}{2}-\frac{1}{3}=\frac{1}{6}$; $\frac{1}{6}=6$; $\frac{6}{6}=36$; $\frac{1}{5}=36$; $\frac{5}{5}=180$, ANS.

(10) 2 persons receive 15c each and one 9c; 3 persons receive 39c, or 13c average price.
$4.68÷13c=36, ANS.

(11) $\frac{5}{7}=\$45$; $\frac{7}{7}=\$63$; $45+4\frac{1}{2}=49\frac{1}{2}$; $49\frac{1}{2}÷63=\frac{11}{14}$, ANS.

(12) $\frac{4}{4}+\frac{3}{4}=\frac{7}{4}$ B; $12\times\frac{7}{4}=21$ da. B; $\frac{3}{4}=21$; $\frac{4}{4}=28$ da. A, ANS.

(13) $\frac{3}{3}$=B; $\frac{2}{3}$=$\frac{3}{5}$; $\frac{3}{3}$=$\frac{9}{10}$; $\frac{9}{10}$+$\frac{1}{10}$=$\frac{10}{10}$; $\frac{1}{10}$=\$5700.
$\frac{1}{10}$=\$3000 B.
$\frac{9}{10}$=\$2700 A, ANS.

(14) $\frac{3}{3}$=A; $\frac{1}{3}$=$\frac{1}{2}$; $\frac{3}{3}$=$\frac{3}{2}$; $\frac{2}{3}$=B; $\frac{3}{4}$ of $\frac{2}{3}$=$\frac{1}{2}$; $\frac{1}{2}$=$\frac{6}{7}$; $\frac{2}{2}$=$\frac{1}{7}$;
$\frac{7}{12}$=C; $\frac{3}{3}$+$\frac{2}{3}$+$\frac{7}{12}$=$\frac{27}{12}$; $\frac{27}{12}$=\$540; $\frac{1}{12}$=\$240 A.
$\frac{2}{3}$=\$160 B; $\frac{7}{12}$=\$140 C, ANS.

(15) $\frac{13}{13}$−$\frac{2}{13}$=$\frac{11}{13}$; $\frac{11}{13}$−$\frac{2}{13}$=$\frac{9}{13}$; $\frac{9}{13}$=\$1000; $\frac{1}{13}$=\$1444$\frac{4}{9}$.
\$1444$\frac{4}{9}$+\$1000=\$2444$\frac{4}{9}$, ANS.

(16) $\frac{1}{2}$: $\frac{3}{4}$ as 2 : 3; 2+3=5; $\frac{2}{5}$ of 490=196 smaller.
$\frac{3}{5}$ of 490=294 larger, ANS.

(17) $\frac{11}{11}$+$\frac{1}{11}$=$\frac{12}{11}$; $\frac{12}{11}$+$\frac{11}{11}$=$\frac{23}{11}$; $\frac{23}{11}$=1357; $\frac{11}{11}$=649 smaller.
$\frac{12}{11}$=708 larger, ANS.

(18) $\frac{4}{4}$−$\frac{1}{4}$=$\frac{3}{4}$; $\frac{3}{4}$=\$36; $\frac{4}{4}$=\$48. $\frac{5}{5}$+$\frac{1}{5}$=$\frac{6}{5}$;
$\frac{6}{5}$=\$48; $\frac{5}{5}$=\$40, ANS.

(19) $\frac{1}{5}$+$\frac{1}{7}$=$\frac{12}{35}$; $\frac{35}{35}$÷$\frac{12}{35}$=2$\frac{11}{12}$ da., ANS.

(20) $\frac{1}{16}$−$\frac{1}{48}$=$\frac{1}{24}$; $\frac{24}{24}$÷$\frac{1}{24}$=24 da., ANS.

(21) $\frac{7}{7}$−$\frac{1}{7}$=$\frac{6}{7}$ A; $\frac{1}{20}$ of $\frac{6}{7}$=$\frac{3}{70}$; $\frac{6}{7}$+$\frac{3}{70}$=$\frac{63}{70}$; $\frac{63}{70}$÷$\frac{7}{7}$=$\frac{9}{10}$ of D's, ANS.

(22) $\frac{2}{3}$=$\frac{3}{4}$; $\frac{3}{3}$=$\frac{12}{10}$; $\frac{5}{8}$ of $\frac{12}{10}$=$\frac{3}{4}$, ANS.

(23) $\frac{3}{3}$=C; $\frac{3}{3}$+$\frac{2}{3}$=$\frac{5}{3}$ B; $\frac{2}{3}$ of $\frac{5}{3}$=$\frac{10}{9}$; $\frac{5}{3}$+$\frac{10}{9}$=$\frac{25}{9}$; $\frac{25}{9}$÷$\frac{3}{3}$=2$\frac{7}{9}$, ANS.

(24) $\frac{2}{3}$=$\frac{4}{5}$; $\frac{3}{3}$=$\frac{6}{5}$; $\frac{5}{5}$+$\frac{6}{5}$=$\frac{11}{5}$; $\frac{6}{5}$÷$\frac{11}{5}$=$\frac{6}{11}$, ANS.

(25) $\frac{1}{4}$+$\frac{1}{5}$=$\frac{9}{20}$; $\frac{20}{20}$−$\frac{9}{20}$=$\frac{11}{20}$; $\frac{11}{20}$−$\frac{9}{20}$=$\frac{1}{10}$; $\frac{1}{10}$=8; $\frac{10}{10}$=80, ANS.

(26) $\frac{7}{5}$−$\frac{5}{5}$=$\frac{2}{5}$; $\frac{2}{5}$=12; $\frac{5}{5}$=30; $\frac{5}{7}$ of 30=21$\frac{3}{7}$ yrs.
30−21$\frac{3}{7}$=8$\frac{4}{7}$ yrs., ANS.

(27) $\frac{9}{9}$×4=$\frac{8}{9}$; $\frac{9}{9}$×2=$\frac{18}{9}$; $\frac{18}{9}$−$\frac{8}{9}$=$\frac{10}{9}$; $\frac{10}{9}$=100; $\frac{9}{9}$=90, ANS.

(28) $\frac{12}{12}$−$\frac{5}{12}$=$\frac{7}{12}$; $\frac{2}{3}$ of $\frac{7}{12}$=$\frac{7}{18}$; $\frac{7}{12}$−$\frac{7}{18}$=$\frac{7}{36}$;
$\frac{7}{36}$=\$2100; $\frac{36}{36}$=\$10,800, ANS.

(29) $\frac{5}{5}$+$\frac{2}{5}$=$\frac{7}{5}$; $\frac{7}{5}$=\$21; $\frac{5}{5}$=\$15 cost A.
$\frac{5}{5}$−$\frac{2}{5}$=$\frac{3}{5}$; $\frac{3}{5}$=\$15; $\frac{5}{5}$=\$25 cost me, ANS.

(30) $\frac{4}{4}$=B; $\frac{4}{4}+\frac{1}{4}=\frac{5}{4}$=A; $\frac{4}{4}+\frac{5}{4}=\frac{9}{4}$; $\frac{9}{4}$=54; $\frac{4}{4}$=24 A.
$\frac{5}{4}$=30 B, ANS.

(31) $\frac{7}{7}-\frac{2}{7}=\frac{5}{7}$; $\frac{5}{7}-\frac{2}{7}=\frac{3}{7}$; $\frac{3}{7}$=8 ft.; $\frac{7}{7}$=18$\frac{2}{3}$ ft., ANS.

(32) $\frac{9}{10}-\frac{4}{5}=\frac{1}{10}$; $\frac{1}{10}$=6; $\frac{10}{10}$=60 B; $\frac{4}{5}$ of 60=48 A, ANS.

(33) $\frac{7}{8}-\frac{3}{4}=\frac{1}{8}$; \$6+\$9=\$15; $\frac{1}{8}$=\$15; $\frac{8}{8}$=\$120 B.
$\frac{7}{8}$ of \$120=\$105; \$105—\$6=\$99 A, ANS.

(34) $\frac{3}{5}=\frac{4}{5}$; $\frac{4}{5}=\frac{16}{15}$; $\frac{16}{15}-\frac{15}{15}=\frac{1}{15}$; $\frac{1}{15}$=2; $\frac{15}{15}$=30 B's age.
$\frac{16}{15}$=32 A's age, ANS.

(35) $\frac{4}{5}$ of 8=6$\frac{2}{5}$ hrs., ANS.

(36) 10×5=50 days for 1 man.
50÷12=4$\frac{1}{6}$ da. for 12 men.
5—4$\frac{1}{6}$=$\frac{5}{6}$ days saved, ANS.

(37) $\frac{5}{5}-\frac{3}{5}=\frac{2}{5}$; $\frac{3}{5}-\frac{2}{5}=\frac{1}{5}$; $\frac{1}{5}$=\$900; $\frac{5}{5}$=\$4500, ANS.

(38) 1+7=8, the worth of both.
$\frac{5}{6}$ of 8=6$\frac{2}{3}$; 6$\frac{2}{3}$÷7=$\frac{20}{21}$, ANS.

(39) $\frac{2}{3}=\frac{3}{4}$; $\frac{3}{3}=\frac{9}{8}$; $\frac{8}{8}+\frac{9}{8}=\frac{17}{8}$; $\frac{17}{8}$=102; $\frac{8}{8}$=48 smaller.
$\frac{9}{8}$=54 larger, ANS.

(40) $\frac{1}{2}-\frac{1}{4}=\frac{1}{4}$; 8+12=20; $\frac{1}{4}$=20; $\frac{4}{4}$=80, ANS.

(41) 8+4=\$12; \$12÷3=\$4; \$4×8=\$32, ANS.

(42) $\frac{3}{4}$c×12=9c; 10+9=19c cost.
$\frac{1}{2}$c×12=5c; 19+6=25c, ANS.

(43) $\frac{1}{10}$ of \$1.00=10c; 2$\frac{3}{4}$÷10=$\frac{11}{40}$, ANS.

(44) 10÷3=3$\frac{1}{3}$c; 3$\frac{1}{3}-\frac{1}{2}$=2$\frac{5}{6}$c cost.
10÷4=2$\frac{1}{2}$c; 2$\frac{5}{6}-2\frac{1}{2}=\frac{1}{3}$c, ANS.

(45) 4 qt.=$\frac{1}{8}$ bu.; $\frac{8}{8}-\frac{1}{8}=\frac{7}{8}$; $\frac{7}{8}$=6 bu.; $\frac{8}{8}$=6$\frac{6}{7}$ bu., ANS.

(46) $\frac{3}{5}$=30; $\frac{5}{5}$=50; $\frac{5}{5}-\frac{3}{5}=\frac{2}{5}$; $\frac{2}{5}$=6; $\frac{5}{5}$=15.
$\frac{1}{15}-\frac{1}{50}=\frac{7}{150}$; $\frac{150}{150}\div\frac{7}{150}$=21$\frac{3}{7}$ da., ANS.

(47) $\frac{3}{3}+\frac{2}{3}=\frac{5}{3}$; $\frac{5}{3}+\frac{3}{3}=\frac{8}{3}$; 4816÷$\frac{8}{3}$=1806;
$\frac{2}{3}$ of 1806=1204 smaller; 4816—1204=3612 larger, ANS.

(48) $\frac{4}{1}+\frac{5}{1}+\frac{1}{1}=\frac{10}{1}$; $\frac{1}{1}\div\frac{10}{1}=\frac{1}{10}$, ANS.

(49) $\frac{1}{60}\times 30=\frac{30}{60}$; $\frac{1}{40}\times 3=\frac{3}{40}$; $\frac{30}{60}+\frac{3}{40}=\frac{69}{120}$.
$\frac{120}{120}-\frac{69}{120}=\frac{51}{120}$; $\frac{51}{120}\div\frac{1}{40}=17$ da.; 30—17=13 da., ANS.

(50) $\frac{1}{12}+\frac{1}{8}=\frac{5}{24}$; $\frac{5}{24}-\frac{1}{6}=\frac{1}{24}$; $\frac{1}{2}$ of $\frac{1}{24}=\frac{1}{48}$ A in one da.
$\frac{1}{12}-\frac{1}{48}=\frac{1}{16}$ B; $\frac{1}{6}-\frac{1}{16}=\frac{5}{48}$ C.
$\frac{1}{48}+\frac{1}{16}+\frac{5}{48}=\frac{9}{48}$; $\frac{48}{48}\div\frac{9}{48}=5\frac{1}{3}$ da., ANS.

(51) $\frac{1}{6}$ of $\frac{3}{5}=\frac{1}{10}$; $\frac{1}{10}$ of $\frac{5}{7}=\frac{1}{14}$; $\frac{1}{14}+\frac{1}{10}=\frac{6}{35}$; $\frac{35}{35}\div\frac{6}{35}=5\frac{5}{6}$ da., ANS.

(52) $\frac{1}{12}-\frac{1}{20}=\frac{1}{30}$; $\frac{30}{30}\div\frac{1}{30}=30$ da., ANS.

(53) $\frac{1}{24}+\frac{1}{34}=\frac{29}{408}$; $\frac{1}{12}-\frac{29}{408}=\frac{5}{408}$; $\frac{408}{408}\div\frac{5}{408}=81\frac{3}{5}$ da., ANS.

(54) A, $\frac{3}{4}$ acres in 1 da.; B, $\frac{5}{6}$; C, $\frac{1}{2}$.
$\frac{3}{4}+\frac{5}{6}+\frac{1}{2}=\frac{25}{12}$ acres together in 1 da.
$2\frac{1}{2}\div\frac{25}{12}=1\frac{1}{5}$ da., ANS.

(55) $\frac{2}{3}+\frac{1}{5}=\frac{13}{15}$; $\frac{30}{15}-\frac{13}{15}=\frac{17}{15}$; $34\div\frac{17}{15}=30$, ANS.

(56) $2\frac{4}{5}=\frac{14}{5}$; $\frac{14}{5}+\frac{5}{5}=\frac{19}{5}$; $\frac{19}{5}=76$; $\frac{5}{5}=20$ A; $2\frac{4}{5}=56$ B, ANS.

(57) $\frac{3}{3}+\frac{2}{3}+\frac{3}{7}=\frac{44}{21}$; $\frac{44}{21}=88$; $\frac{21}{21}=42$ A; $\frac{2}{3}$ of $42=28$ B.
$\frac{3}{7}$ of $42=18$ C, ANS.

(58) $\frac{4}{4}$=C, $\frac{3}{4}$=B, $\frac{9}{20}$=A; $\frac{4}{4}+\frac{3}{4}+\frac{9}{20}=\frac{44}{20}$; $\frac{44}{20}=\$440$;
$\frac{20}{20}=\$200$ C; $\frac{3}{4}$ of $\$200=\$150$ B; $\frac{3}{5}$ of $\$150=\$90$, ANS.

(59) $\frac{1}{1}+\frac{2}{1}+\frac{4}{1}=\frac{7}{1}$; $\frac{7}{1}=98$; $\frac{1}{1}=14$ C; $\frac{2}{1}=28$ B; $\frac{4}{1}=56$ A, ANS.

(60) $\frac{3}{3}-\frac{2}{3}=\frac{1}{3}$; $\frac{1}{3}-\frac{1}{5}=\frac{2}{15}$; $\$7+\$3=\$10$; $\frac{2}{15}=\$10$; $\frac{1}{15}=\$75$, ANS.

(61) $91\div 7=13$; $91\times 7=637\div 13=49$ larger; $91-49=42$ smaller, ANS.

(62) $\frac{1}{6}-\frac{1}{10}=\frac{1}{15}$; $\frac{15}{15}\div\frac{1}{15}=15$ da., ANS.

(63) $4\div 6=\frac{2}{3}$; A does $\frac{3}{3}$ while B does $\frac{2}{3}$; $\frac{2}{3}=20$; $\frac{3}{3}=30$ da., ANS.

(64) $\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{5}{6}=\frac{5}{12}$; $\frac{8}{9}=\$\frac{9}{10}$; $\frac{9}{9}=\$\frac{81}{80}$; $\frac{5}{12}\times\$\frac{81}{80}=\$\frac{27}{64}$, ANS.

(65) $\frac{8}{8}-\frac{1}{8}=\frac{7}{8}$; $\frac{2}{3}$ of $\frac{7}{8}=\frac{7}{12}$; $\frac{8}{8}+\frac{7}{12}=\frac{38}{24}$; $\frac{38}{24}=18\ 24$; $\frac{24}{24}=11.52$, ANS.

(66) $\$12\frac{3}{4}+\$5\frac{1}{2}=\$18\frac{1}{4}$; $\$125\frac{1}{2}-\$18\frac{1}{4}=\$107\frac{1}{4}$; $\frac{1}{3}$ of $\$107\frac{1}{4}=\$35\frac{3}{4}$ A.
$\$35\frac{3}{4}+\$5\frac{1}{2}=\$41\frac{1}{4}$, B; $\$41\frac{1}{4}+\$7\frac{1}{4}=\$48\frac{1}{2}$ C, ANS.

(67) $\frac{7}{7}+\frac{6}{7}=\frac{13}{7}$; 45+20=65; $\frac{13}{7}=65$; $\frac{7}{7}=35$, ANS.

(68) $\frac{7}{2}-\frac{2}{2}=\frac{5}{2}$; $\frac{5}{2}=100$; $\frac{2}{2}=40$; $\frac{7}{2}=140$. 40 and 140, ANS.

(69) $\frac{3}{3}+\frac{1}{3}+\frac{1}{4}=\frac{19}{12}$; $\frac{19}{12}-\frac{1}{6}=\frac{17}{12}$; $\frac{17}{12}=51$; $\frac{12}{12}=36$, ANS.

(70) $\frac{1}{4}=20$; $\frac{4}{4}=80$c cost; 94—80=14; 14÷7=2c.
94÷2=47, ANS.

(71) $\frac{1}{3}+\frac{1}{4}+\frac{1}{6}=\frac{9}{12}$; $\frac{9}{12}=\$18$; $\frac{12}{12}=\$24$, ANS.

(72) $9\frac{3}{8}-4\frac{3}{8}=5$; 5÷2=$2\frac{1}{2}$; $2\frac{1}{2}+4\frac{3}{8}=6\frac{7}{8}$; $6\frac{7}{8}\times 4=27\frac{1}{2}$;
$27\frac{1}{2}\div 2\frac{1}{2}=11$, ANS.

(73) $\frac{9}{10}$ of $\frac{31}{11}=\frac{279}{110}$; $\frac{279}{110}=\$40{,}500$; $\frac{110}{110}=\$165{,}000$; $\frac{5}{7}$ of $\frac{3}{5}=\frac{3}{7}$;
$\frac{3}{7}$ of $\$165{,}000=\$70{,}714\frac{2}{7}$, ANS.

(74) $\frac{2}{3}:\frac{4}{5}::3:4=\frac{9}{19}$ A, $\frac{10}{19}$ B; $\frac{9}{19}$ of $1520=$720 A.
$\frac{10}{19}$ of $1520=$800 B, ANS.

(75) $\frac{8}{8}=$B; $\frac{2}{3}=\frac{3}{4}$; $\frac{3}{3}=\frac{9}{8}$ A; $\frac{9}{8}+\frac{8}{8}=\frac{17}{8}$; $\frac{17}{8}=153$; $\frac{8}{8}=72$ B.
$\frac{9}{8}=81$ A, ANS.

(76) $\frac{5}{7}=100$; $\frac{7}{7}=140$; 140+100=240;
240÷18=$13\frac{1}{3}$; one mile in $13\frac{1}{3}$ min., ANS.

(77) $\frac{3}{4}=20$; $\frac{4}{4}=26\frac{2}{3}$; $\frac{1}{4}$ of $26\frac{2}{3}=6\frac{2}{3}$; $\frac{3}{5}$ of $6\frac{2}{3}=4$ hrs., ANS.

(78) One man can do $\frac{1}{240}$ in one day.
$\frac{1}{5}$ of 12=$2\frac{2}{5}$ da.; $\frac{1}{240}\times\frac{12}{5}=\frac{1}{100}$; $\frac{100}{100}\times 3=\frac{300}{100}$.
$\frac{300}{100}\div\frac{1}{100}=300$, ANS.

(79) $2660\times 1\frac{5}{7}=\$4560$; $\frac{1}{2}$ of $4560=$2280.
$2280\div 2\frac{5}{7}=\$840$; $840÷2=$420, ANS.

(80) 7,250—1,250=6000; $\frac{8}{8}+\frac{7}{8}=\frac{15}{8}$; $\frac{15}{8}=6{,}000$;
$\frac{8}{8}=3200$ B; $\frac{7}{8}$ of 3200=2800; 2800+1250=4050 A, ANS.

(81) $7862\times 7\frac{1}{2}=58{,}965$; $\frac{4}{5}$ of $\frac{5}{6}=\frac{2}{3}$; $\frac{2}{3}$ of 58,965=39,310;
$\frac{1}{2}$ of $\frac{1}{5}=\frac{1}{10}$; $\frac{1}{10}$ of 39310=3931; 39310—3931=35379, ANS.

(82) 12+12=24; $\frac{1}{4}=24$; $\frac{4}{4}=96$ in., ANS.

(83) $\frac{3}{3}-\frac{2}{3}=\frac{1}{3}$; $\frac{2}{3}$ of $(\frac{1}{3}+24)=\frac{2}{9}+16$; $(\frac{1}{3}+24)-(\frac{2}{9}+16)=\frac{1}{9}+\$8$.
$48—$8=$40; $\frac{1}{9}=$40; $\frac{9}{9}=$360, ANS.

(84) $\frac{3}{3}-\frac{2}{3}=\frac{1}{3}$; $\frac{1}{3}-\frac{1}{4}=\frac{1}{12}$; $3+2=5$; $\frac{1}{12}=5$; $\frac{12}{12}=60$;
$\frac{2}{3}$ of $60=40$; $40+3=43$ gal. acid.
$\frac{1}{4}$ of $60=15$; $15+2=17$ gal. acid, ANS.

(85) $\frac{1}{2}+(\frac{3}{4}\times\frac{2}{3}\div\frac{4}{5})-(\frac{1}{8}\div\frac{1}{10})+(\frac{6}{8}\times\frac{2}{6})=\frac{1}{8}$, ANS.

(86) $68+$1$=$69; $\frac{7}{7}=$69; $\frac{7}{7}=$161; $\frac{1}{2}$ of $161=$80.50;
$80.50—$69=$12.50, ANS.

(87) $\frac{2}{3}+24=\frac{3}{4}$; $\frac{4}{4}=\frac{3}{3}+$32; $\frac{8}{8}+\frac{8}{8}=\frac{17}{8}$; $512—$32=$510;
$\frac{17}{8}=$510; $\frac{8}{8}=$240; $240+32=$272 B's.
$542—$272=$270 A's, ANS.

(88) $\frac{2}{3}=\frac{3}{4}+8$; $\frac{3}{3}=\frac{9}{8}+12$; $148—12=136$; $\frac{8}{8}+\frac{9}{8}=\frac{17}{8}$.
$\frac{17}{8}=136$; $\frac{8}{8}=64$ A; $\frac{9}{8}=72$; $72+12=84$ B, ANS.

(89) $1.0._{00}\frac{3}{3}=$101; $101\times10=$1010, ANS.

(90) $\frac{3}{4}:\frac{2}{3}::\frac{6}{7}:\frac{3}{4}=\frac{63}{64}$; A : B as $63:64$; $\frac{2}{3}$ of $63=42$;
$\frac{3}{4}$ of $64=48$; $48+42=90$; $\frac{42}{90}$ of $180=84$;
$\frac{2}{3}=84$; $\frac{3}{3}=126$ A; $\frac{48}{90}$ of $180=96$; $\frac{3}{4}=96$; $\frac{4}{4}=128$ B, ANS.

(91) $\frac{4}{4}=$C, $\frac{2}{4}=$B, $\frac{1}{8}+$12=A; $645—$12=$633.
$\frac{4}{4}+\frac{2}{4}+\frac{1}{8}=\frac{20}{12}$; $\frac{20}{12}=$633; $\frac{12}{12}=$379.80 C.
$\frac{1}{2}$ of $379.80=$189.90 B; ($\frac{1}{3}$ of $189.90)+$12=$75.30 A, ANS.

(92) $\frac{1}{4}=4$ times; $\frac{4}{4}=16$ times; $16+1=17$; $170\div17=$10 pig;
$10\times16=$160 horse, ANS.

(93) $\frac{1}{3}=3$; $\frac{3}{3}=9$; $6=9$; $1=1\frac{1}{2}$; $\frac{1}{5}$ of $50=10$; $10\times1\frac{1}{2}=15$, ANS.

(94) $1.00._{00}\frac{2}{4}=$6; $6\times100=$600, ANS.

(95) $20+20=40$; $\frac{1}{2}=40$ yrs.; $\frac{2}{2}=80$ C; $80—20=60$ B, ANS.

(96) $10\times2=20$; $35—20=15$ yrs., ANS.

(97) $\frac{1}{20}$=what they both do in one hr.
$\frac{3}{4}+\frac{4}{4}=\frac{7}{4}$; $\frac{7}{4}=20$; $\frac{4}{4}=\frac{1}{35}$; $\frac{35}{35}\div\frac{1}{35}=35$ hrs. B.
$\frac{3}{4}=35$; $\frac{4}{4}=46\frac{2}{3}$ hrs., A, ANS.

(98) $\frac{4}{4}+\frac{1}{4}=\frac{5}{4}$; $\frac{8}{4}-\frac{5}{4}=\frac{3}{4}$; $\frac{3}{4}=20$; $\frac{4}{4}=26\frac{2}{3}$, ANS.

(99) $\frac{1}{2}=\frac{3}{5}$; $\frac{2}{2}=\frac{6}{5}$; $\frac{6}{5}-\frac{5}{5}=\frac{1}{5}$; $\frac{1}{5}=8$; $\frac{5}{5}=40$ B.
$\frac{6}{5}=48$ A, ANS.

(100) $\frac{11}{11}-\frac{2}{11}=\frac{9}{11}$; $\frac{3}{4}$ of $(\frac{9}{11}+65)=(\frac{27}{44}+\frac{195}{4})$; $(\frac{9}{11}+65)-(\frac{27}{44}+\frac{195}{4})$ $=(\frac{9}{44}+\frac{655}{4})$; $(\frac{9}{44}+\frac{655}{4})=(\frac{1}{4}-10)$; $\frac{655}{4}+10=\frac{105}{4}$; $\frac{44}{44}=33$, ANS.

(101) $\frac{3}{4}=\frac{99}{368}$ of $(\frac{9}{11}+\$65)$; $\frac{4}{4}=\$33$; $\frac{2}{11}$ of $\$33=\$6$ spent, ANS.

(102) $\frac{3}{4}$ of $5\frac{1}{2}=\frac{33}{8}$; $\frac{1}{2}$ of $\frac{1}{12}=\frac{1}{24}$; $\frac{1}{24}=\frac{33}{8}$; $\frac{24}{24}=\frac{792}{8}$; $\frac{792}{8}=99$ fur.; $99\div 8=12\frac{3}{8}$ mi., ANS.

(103) $\frac{3}{3}+\frac{2}{3}=\frac{5}{3}$; $\frac{1}{2}$ of $\frac{2}{3}=\frac{1}{3}$; $\frac{1}{5}$ of $\frac{5}{3}=\frac{1}{3}$; $\frac{1}{3}\times\frac{1}{3}=\frac{1}{9}$; $\frac{1}{9}=4$; $\frac{9}{9}=\$36$; $\frac{2}{3}$ of $\$36=\$24$, ANS.

(104) $\frac{3}{3}-\frac{1}{3}=\frac{2}{3}$ A; $\frac{3}{3}+100=\frac{6}{3}$; $\frac{3}{3}=\$100$, ANS.

(105) $\frac{3}{4}=7\frac{1}{2}$ rds.; $\frac{4}{4}=10$ rds.; $12-10=2$; $100\div\frac{2}{12}=600$, ANS.

(106) $\frac{3}{10}+\frac{5}{12}=\frac{43}{60}$; $\frac{43}{60}\div 2=\frac{43}{120}$; $\frac{5}{12}-\frac{43}{120}=\frac{7}{120}$. $\frac{7}{120}=\$3500$; $\frac{120}{120}=\$60{,}000$, ANS.

(107) $10+14=24$ years; $\frac{3}{3}-\frac{1}{3}=\frac{2}{3}$; $\frac{2}{3}=24$; $\frac{3}{3}=36$ father's age 10 yrs. ago; $36+10=46$; $46-14=32$; $32-2=30$; $30\div 2=15$; $15+2=17$. 15 and 17 yrs., ANS.

(108) $\frac{2}{2}$=what he had at first.
$\frac{2}{2}+\frac{4}{2}=\frac{6}{2}$; $\frac{4}{5}$ of $(\frac{6}{2}-\$16)=\frac{24}{10}-\frac{64}{5}$.
$(\frac{6}{2}-\$16)-(\frac{24}{10}-\frac{64}{5})=\frac{6}{10}-\frac{16}{5}$.
$\frac{6}{10}+\frac{2}{2}=\frac{16}{10}$; $\frac{16}{10}-\frac{16}{5}=80$; $\frac{80}{1}+\frac{16}{5}=\frac{416}{5}$.
$\frac{16}{10}=\frac{416}{5}$; $\frac{10}{10}=\$52$, ANS.

(109) $\frac{4}{4}+\frac{1}{4}=\frac{5}{4}$; $\frac{5}{4}=\$40$; $\frac{4}{4}=32$ men.
$32\times.20=\$6.40$; $\frac{4}{4}=\$6.40$; $\frac{5}{4}=\$8$.
$\$40-\$8=\$32$; $\$32\div 32=\$1.00$.
$\$40\div\$1.00=40$ men, ANS.

(110) $\frac{3}{8}+\frac{3}{5}=\frac{39}{40}$; $\frac{40}{40}-\frac{39}{40}=\frac{1}{40}$. $\$15-\$13=\$2$.
$\frac{1}{40}=\$2$; $\frac{40}{40}=\$80$, ANS.

(111) $\frac{2}{5}-\frac{1}{3}=\frac{1}{15}$; $6+10=16$. $\frac{1}{15}=16$; $\frac{15}{15}=240$.
$\frac{2}{5}$ of $240=96$ A; $\frac{1}{3}=80$ B; $80+96=176$.
$240-176=64$ C, ANS.

(112) $2\times 4=8$; $20-8=12$; $\frac{1}{3}=12$; $\frac{3}{3}=36$, A.
$\frac{1}{3}$ of $36=12$; $12+2=14$ B, ANS.

(113) $\frac{1}{11}$—2=$\frac{1}{7}$; $\frac{11}{11}$—22=$\frac{11}{7}$.
22+13=35; $\frac{11}{7}$ of 35=55 A.
$\frac{1}{11}$ of 55=5; 5—2=3; $\frac{1}{7}$=3; $\frac{7}{7}$=21 B, ANS.

(114) $\frac{1}{3}$=14; $\frac{3}{3}$=42 sum.
$\frac{1}{2}$=4; $\frac{2}{2}$=8; 42—8=34; 34÷2=17 smaller.
42—17=25 larger, ANS.

(115) $\frac{1}{9}$=4; $\frac{9}{9}$=36; 75÷1$\frac{1}{2}$=50; 50—36=14; 14÷2=7 the smaller. 50—7=43, the larger, ANS.

(116) $\frac{1}{5}$=16; $\frac{5}{5}$=80 sum. 80×4=320.
480—320=160; 160÷4=40 diff.
80+40=120; 120÷2=60, the larger.
80—40=40; 40÷2=20, the smaller, ANS.

(117) \$1.0$\frac{2}{0}$0$\frac{2}{0}$—\$.00$\frac{4}{0}$0$\frac{4}{0}$4=\$1; \$1×4=\$4 gain, ANS.

(118) Goes one mile in $\frac{2}{9}$ of an hr.
Comes one mile in $\frac{1}{3}$ of an hr.
$\frac{2}{9}$+$\frac{1}{3}$=$\frac{5}{9}$; 7$\frac{1}{2}$÷$\frac{5}{9}$=13$\frac{1}{2}$ mi., ANS.

(119) $\frac{4}{4}$=larger; $\frac{3}{4}$ of ($\frac{4}{4}$—287)=$\frac{1}{6}$ of ($\frac{4}{4}$+287);
$\frac{4}{4}$=451 larger, ANS.

(120) $\frac{5}{5}$—$\frac{2}{5}$=$\frac{3}{5}$; $\frac{1}{5}$ of $\frac{3}{5}$=$\frac{3}{25}$; $\frac{3}{5}$—$\frac{3}{25}$=$\frac{12}{25}$ cost.
$\frac{10}{10}$—$\frac{1}{10}$=$\frac{9}{10}$; $\frac{1}{20}$ of $\frac{9}{10}$=$\frac{9}{200}$; $\frac{9}{10}$—$\frac{9}{200}$=$\frac{171}{200}$; $\frac{171}{200}$—$\frac{12}{25}$=\$$\frac{3}{8}$, ANS.

(121) $\frac{2}{5}$—$\frac{7}{20}$=$\frac{1}{20}$; $\frac{7}{20}$ of 10=3$\frac{1}{2}$.
$\frac{1}{20}$=3$\frac{1}{2}$; $\frac{20}{20}$=70 gal., ANS.

(122) $\frac{4}{4}$=smaller; 12$\frac{1}{2}$ times $\frac{4}{4}$=$\frac{50}{4}$, the larger.
$\frac{4}{4}$+$\frac{50}{4}$=$\frac{54}{4}$=12$\frac{1}{2}$, number to be divided.
$\frac{1}{4}$=$\frac{25}{108}$; $\frac{4}{4}$=$\frac{25}{27}$ smaller.
12$\frac{1}{2}$—$\frac{25}{27}$=11$\frac{31}{54}$ larger, ANS.

(123) $\frac{5}{5}$=watch; $\frac{1}{5}$ ($\frac{5}{5}$—[48—$\frac{5}{5}$])=48—$\frac{5}{5}$.
$\frac{5}{5}$=\$30 watch; \$48—\$30=\$18 chain, ANS.

(124) $\frac{1}{3}$ of \$30=\$10 gain; \$10÷125=8c S. P.
$\frac{3}{3}$+$\frac{1}{3}$=$\frac{4}{3}$; $\frac{4}{3}$=8; $\frac{3}{3}$=6c C. P., ANS.

(125) $\frac{2}{3}$ of \$1=.66$\frac{2}{3}$; $\frac{1}{5}$=.66$\frac{2}{3}$; $\frac{5}{5}=\frac{10}{3}$;
$\frac{3}{7}$ of $\frac{10}{3}=\frac{10}{7}$; $\frac{10}{7}=\frac{1}{14}$; $\frac{14}{14}$=\$20.
\$20×10=\$200, ANS.

(126) 20×4=80; 80+20=100 yrs. sum of all their ages.
$\frac{9}{9}+\frac{1}{9}=\frac{10}{9}$; $\frac{10}{9}$=100; $\frac{9}{9}$=90 sum of A and C.
$\frac{1}{9}$ of 90=10 C; 80—10=70 B, ANS.

(127) $\frac{1}{4}$=3; $\frac{4}{4}$=12; if 8=12, one will equal $1\frac{1}{2}$; 90×$1\frac{1}{2}$=135;
$\frac{1}{2}$ of 135=$67\frac{1}{2}$, ANS.

PERCENTAGE.

(1) $\frac{5}{5}+\frac{1}{5}=\frac{6}{5}$; $\frac{6}{5}$=\$84; $\frac{5}{5}$=\$70; \$100—\$70=\$30.
\$30÷\$70=$42\frac{6}{7}$%, ANS.

(2) \$72—\$6=\$66, cost of $\frac{3}{4}$; $\frac{1}{4}=\frac{1}{3}$ of \$66=\$22.
$\frac{4}{4}$=\$88, cost of lot. \$100—\$88=\$12.
\$12÷\$88=$13\frac{7}{11}$%, ANS.

(3) $\frac{1}{5}$ of \$10=\$2; \$10—\$2=\$8 cost; \$12—\$8=\$4; \$4÷\$8=50%, ANS.

(4) \$440÷(100%+10%)=\$400 cost.
25% of \$400=\$100; \$400—\$100=\$300, ANS.

(5) 125%=A; 125%÷2=$62\frac{1}{2}$% B; 100%—$62\frac{1}{2}$%=$37\frac{1}{2}$%;
$37\frac{1}{2}$%=\$225; 100%=\$600, ANS.

(6) \$300÷125%=\$240; \$300÷75%=\$400.
\$400+\$240=\$640 C. P.; \$300×2=\$600 S. P.
\$640—\$600=\$40 loss; \$40÷\$640=$6\frac{1}{4}$%, ANS.

(7) 100%+20%=120%; 100%—20%=80%; 120%—80%=40%;
40%=\$250; 100%=\$625; 80%=\$500, ANS.

(8) $\frac{3}{4}=\frac{2}{3}$; $\frac{4}{4}=\frac{8}{8}$ cost of 1st; $\frac{9}{9}$=cost of 2d.
25% of $\frac{8}{9}=\frac{2}{9}$; $\frac{8}{9}+\frac{2}{9}=\frac{10}{9}$ S. P. of 1st.
10% of $\frac{9}{9}=\frac{9}{90}$; $\frac{9}{9}+\frac{9}{90}=\frac{99}{90}$ S. P. of 2d.
$\frac{10}{9}+\frac{99}{10}=\frac{199}{90}$; $\frac{199}{90}=\$597$; $\frac{90}{90}=\$270$; $\frac{8}{9}=\$240$, ANS.

(9) $\frac{3}{4}=\frac{7}{8}$; $\frac{4}{4}=\frac{7}{6}$; $\frac{7}{6}-\frac{6}{6}=\frac{1}{6}$ gain. $\frac{1}{6}=16\frac{2}{3}\%$, ANS.

(10) $\frac{1}{2}=\frac{5}{7}$; $\frac{2}{1}=\frac{10}{7}$; $\frac{10}{7}-\frac{7}{7}=\frac{3}{7}$; $\frac{3}{7}=42\frac{6}{7}\%$, ANS.

(11) $\frac{3}{4}$ of \$600=\$450; \$450÷$33\frac{1}{3}\%$=\$1350.
$\frac{1}{2}$=\$1350; $\frac{2}{2}$=\$2700, ANS.

(12) 25% of $33\frac{1}{3}\%=8\frac{1}{3}\%$; $8\frac{1}{3}\%$=\$3350.50; 100%=\$40206, ANS.

(13) $\frac{1}{8}$ of $\frac{1}{4}$ of 60=5; 75% of $33\frac{1}{3}\%$=25%.
25%=5; 100%=20, ANS.

(14) $66\frac{2}{3}\%$ of $\frac{3}{5}$ of 100=$26\frac{2}{3}$; 5% of 10 times 25%=$12\frac{1}{2}\%$.
$12\frac{1}{2}\%=26\frac{2}{3}$; 100%=$213\frac{1}{3}$, ANS.

(15) $8\frac{1}{2}\%$ of $\frac{1}{2}=\frac{17}{400}$; $\frac{17}{400}=\$80$; $\frac{400}{400}=\$1882\frac{6}{17}$, ANS.

(16) $\frac{1}{3}$ of \$3000=\$1000; \$1000÷$62\frac{1}{2}\%$=\$1600, ANS.

(17) $37\frac{1}{2}\%$ of $\frac{1}{4}$ of 20% of 480=9.
$\frac{1}{4}$ of $\frac{8}{9}$ of 50% of 324=36; 36—9=27, ANS.

(18) \$21÷(100%—$12\frac{1}{2}\%$)=\$24 cost; \$24×$112\frac{1}{2}\%$=\$27, ANS.

(19) 100%=labor; 300%=material.
100%+4%=104%; 300%—15%=285%.
285%+104%=389%; 389%=\$2334; 400%=\$2400, ANS.

(20) 100%=labor; 300%=material; 400%=both.
100%+4%=104%; 5% of 300%=15%; 300%—15%=285%;
285%+104%=389%; 400%—389%=11%.
11%=\$36; 100%=\$600; 300%=\$1800, ANS.

(21) \$141.90÷(100%—$12\frac{1}{2}\%$)=\$161.25.
\$161.25÷(100%+$7\frac{1}{2}\%$)=\$150, ANS.

(22) 75%—60%=15%; 15%=\$1.00; 100%=\$$6\frac{2}{3}$.
60% of \$$6\frac{2}{3}$=\$4, ANS.

(23) 50% of \$425=\$212.50.
30% of \$425=\$127.50; \$425—\$127.50=\$297.50.
20% of \$297.50=\$59.50; \$297.50—\$59.50=\$238.
\$238—\$212=\$25.50, ANS.

(24) 30% of \$60=\$18; \$60—\$18=\$42; $16\frac{2}{3}$% of \$42=\$7.
\$42—\$7=\$35 cost; 5% of \$60=\$3; \$60+\$3=\$63.
\$63—\$35=\$28, ANS.

(25) $\frac{1}{3}$ of \$725.16=\$241.72; \$725.16—\$241.72=\$483.44.
5% of \$483.44=\$24.17; \$483.44—\$24.17=\$459.27, ANS.

(26) $\frac{2}{3}=\frac{3}{4}$; $\frac{3}{3}=\frac{9}{8}$; $\frac{9}{8}-\frac{8}{8}=\frac{1}{8}$; $\frac{1}{8}=12\frac{1}{2}$%, ANS.

(27) 140% : 160% :: 36 in : $(x)=41\frac{1}{7}$ in., ANS.

(28) 100%+40%=140%; 10% of 140%=14%; 140%—14%=126%; 20% of 126%=.252; 126%—.252=1.008.
1.008—100%=.008; .008÷100=$\frac{4}{5}$%, ANS.

(29) 30c÷150%=20c price of mixture.
40c—20c=20c; 20c÷40c=50%, ANS.

(30) 20%=30%; 1%=$1\frac{1}{2}$%; 100%=150%.
100%+30%=130%; 150%—130%=20%, ANS.

(31) 100%—20%=80%; $\frac{3}{4}$=80%; $\frac{4}{4}=106\frac{2}{3}$%;
$106\frac{2}{3}$%—100%=$6\frac{2}{3}$%, ANS.

(32) $66\frac{2}{3}$% of 240=160; 100%—$11\frac{1}{9}$%=$88\frac{8}{9}$%.
$88\frac{8}{9}$%=160; 100%=180; 20%=180; 100%=900, ANS.

(33) $\frac{3}{4}=\frac{3}{5}$; $\frac{4}{4}=\frac{4}{5}$; $\frac{5}{5}-\frac{4}{5}=\frac{1}{5}$; $\frac{1}{5}$=20% loss.

(34) \$300÷120%=\$250 cost of 1st.
\$300÷75%=\$400 cost of 2nd.
\$400+\$250=\$650 cost of both.
\$300×2=\$600 S. P. of both.
\$650—\$600=\$50 loss, ANS.

(35) 100%—40%=60%; 60%=\$30; 100%=\$50.
50% of \$50=\$25; \$50+\$25=\$75.
\$75—\$30=\$45, ANS.

(36) 100%—37½%=62½%; 62½%=$60; 100%=$96.
$96÷(100%+20%)=$80; $96—$80=$16, ANS.

(37) 8%=15%; 1%=1⅞%; 100%=187½%; 100%+15%=115%;
187½%—115%=72½%, ANS.

(38) 5%=$\frac{1}{20}$; $\frac{20}{20}-\frac{1}{20}=\frac{19}{20}$; 50c×133⅓=66⅔c.
66⅔c÷$\frac{19}{20}$=70$\frac{10}{57}$c, ANS.

(39) 100÷.005=2,000,000%, ANS.

(40) 100%+10%=110% or $\frac{11}{10}$; 10%=$\frac{1}{10}$;
$\frac{1}{10}\div\frac{11}{10}=\frac{1}{11}$; $\frac{1}{11}$=20; $\frac{11}{11}$=220%.
220%—100%=120%, ANS.

(41) $\frac{2}{3}=\frac{8}{12}$; $\frac{8}{3}=\frac{9}{8}$; $\frac{9}{8}-\frac{8}{8}=\frac{1}{8}$; $\frac{1}{8}$=12½%.

(42) 100%—20%=80%; 80%=$\frac{4}{5}$; $\frac{5}{5}-\frac{4}{5}=\frac{1}{5}$.
$\frac{1}{5}$ of $\frac{5}{4}=\frac{1}{4}$; $\frac{1}{4}$=15%; $\frac{4}{4}$=60%.
100%—60%=40%, ANS.

(43) 20% of $180=$36; $180+$36=$216.
100%—10%=90%; $216÷90%=$240, ANS.

(44) 12%—10%=2%; 2%=$150; 100%=$7500 C.
60% of $7500=$4500; $7500+$4500=$12000 B.
$7500+$12000=$19500; 100%—35%=65%;
65%=$19500; 100%=$30000; 35% of $30000=$10500 A,
ANS.

(45) 100%—10%=90%; 90%=$18; 100%=$20.
$20—$12=$8; $8÷10=80c; $12÷80c=15 lbs., ANS.

(46) 100%—25%=75%; 100%+25%=125%; 125%—75%=50%.
50%÷75%=66⅔%, ANS.

(47) 20% of $4=.80; $4+.80=$4.80
100%—20%=80%; 80%=$4.80; 100%=$6, ANS.

(48) $12550—$400=$12150; 125%+100%=225%.
225%=$12150; 100%=$5400 B.
125% of $5400=$6750; $6750+$400=$7150 A, ANS.

(49) $\frac{4}{5}+\frac{5}{5}=\frac{9}{5}$; $\frac{9}{5}=\$810$; $\frac{5}{5}=\$450$; $\frac{4}{5}=\$360$.
$\$360\div(100\%+33\frac{1}{3}\%)=\$270$ C. P. of 1st.
$\$450\div(100\%-11\frac{1}{9}\%)=\$506.25$ C. P. of 2nd.
$\$506.25+\$270=\$776.25$.
$\$810-\$776.25=\$33.75$, ANS.

(50) $74\times5=370$ lbs.; $370\times.45=\$166.50$.
2% of $\$166.50=\$3.33$; $\$166.50-\$3.33=\$163.17$;
$\$163.17\times12\frac{1}{2}\%=\$20.12+$, ANS.

(51) $80\%-25\%=55\%$; $100\%-55\%=45\%$;
$45\%=66\frac{2}{3}\%$; $100\%=148\frac{4}{27}\%$.
$100+66\frac{2}{3}\%=166\frac{2}{3}\%$; $166\frac{2}{3}\%-148\frac{4}{27}\%=18\frac{14}{27}\%$, ANS.

(52) $100\%\div(100\%-25\%)=133\frac{1}{3}\%$; $100\%\div(100\%+25\%)=80\%$
$133\frac{1}{3}\%+80\%=213\frac{1}{3}\%$; $213\frac{1}{3}\%-200\%=13\frac{1}{3}\%$ loss.
$13\frac{1}{3}\%=\$30$; $100\%=\$225$ S. P.
$\$225\times80\%=\$180$ 1st.
$\$225\div(100\%-25\%)=\$300$ 2nd, ANS.

(53) $6c\times150=\$9.00$; $\$9\times110\%=\$9.90$;
$100\%-5\%=95\%$; $6c\times95\%=5.7c$.
$5.7c\times100$ lbs.$=\$5.70$; $\$9.90-\$5.70=\$4.20$;
$\$4.20\div50$ lbs.$=8\frac{2}{5}c$, ANS.

(54) $100\%=$cost; $\frac{1}{2}$ of $100\%=50\%$; $50\%\times125\%=62\frac{1}{2}\%$;
$\frac{2}{5}$ of $100\%=40\%$; $40\%\times112\frac{1}{2}\%=45\%$;
$50\%+40\%=90\%$; $100\%-90\%=10\%$;
$\frac{1}{2}$ of $10\%=5\%$; $62\frac{1}{2}\%+45\%+5\%=112\frac{1}{2}\%$;
$\$1125\div112\frac{1}{2}\%=\$1000$, ANS.

(55) $100\%-15\%=85\%$; 5% of $85\%=.0425$
$85\%-.0425=.8075$
$100\%-5\%=95\%$; 15% of $95\%=.1425$
$95\%-.1425=.8075$
$.8075-.8075=0$, ANS.

(56) 30% of $\$850=\$255$; $\$850-\$255=\$595$.
$2\frac{1}{2}\%$ of $\$595=\$14.87\frac{1}{2}$; $\$595-\$14.87\frac{1}{2}=\$580.12\frac{1}{2}$, ANS.

(57) 40%=60%; 100%=150%; 100%+150%=250%.
250%=4655; 100%=1862; 150%=2793, ANS.

(58) 100%—24%=76%; 76%=$760; 100%=$1000, ANS.

(59) 100%—12½%=87½%; $1.60×87½%=$1.40.
$1.40÷(100%—30%)=$2.00, ANS.

(60) $72×125%=$90; $90÷(100%—10%)=$100, ANS.

(61) $480×112½%=$540; 1½%=$540; 100%=$36,000, ANS.

(62) $120 ÷ (100% — 8%) = 130\frac{10}{23}$; 130\frac{10}{23}$ × (100% — 10%) = 117\frac{9}{23}$, ANS.

(63) $105÷(100%+25%)=$84.
$105÷(100%—25%)=$140; $140+$84=$224 C. P.
$105×2=$210; $224—$210=$14 loss, ANS.

(64) 75% of $600=$450; 3⅓%=$450; 100%=$1350.
½=$1350; ²⁄₂=$2700, ANS.

(65) 25% of ⅓=$\frac{1}{12}$; $\frac{1}{12}$=$350; $\frac{12}{1}$=$4200, ANS.

(66) 100%—20%=80%; 5% of 80%=.04; 80%—4%=76%.
(100%+15%)—76%=.39; .39÷76%=51$\frac{6}{19}$%, ANS.

(67) 10% of 125%=12½%; 125%—12½%=112½%.
112½%—100%=12½%; 12½%=$4684; 100%=$37,472, ANS.

(68) 100%÷120%=83⅓%; 100%÷125%=80%; 83⅓%—80%=3⅓%.
3⅓%=$60; 100%=$1800; $1800×83⅓%=$1500, ANS.

(69) 100%÷(100%+25%)=80%; 100%÷(100%—25%)=133⅓%.
(133⅓%+80%) — (100%×2)=13⅓%; 13⅓%=$60; 100%=$450.
$450×80%=$360 1st; $450÷75%=$600 2d, ANS.

(70) $120×(100%—25%)=$90; $90×133⅓%=$120; $120—$120=0, ANS.

(71) (100%+20%) — (100%—20%)=40%; 40%=$90; 100%=$225, ANS.

(72) $\frac{1}{2}$ of \$1200=\$600; \$600×115%=\$690; \$90 gain.
\$600÷15¢=4000 yds.; 17½¢×4000 yds.=\$700; **\$100 gain.**
\$100+\$90=\$190, ANS.

(73) $\frac{3}{5}$ of 100%=60%; 60%×130%=78%; $\frac{2}{5}$ of 100%=40%.
40%×(100%—5%)=38%; 38%+78%=116%; 116%—100%=16%
16%=\$720; 100%=\$4,500, ANS.

(74) 30%=$\frac{30}{100}$; $\frac{30}{100}$ of $\frac{2}{5}$=$\frac{3}{25}$ gain.
5%=$\frac{5}{100}$; $\frac{5}{100}$ of $\frac{3}{5}$=$\frac{3}{100}$ loss.
$\frac{3}{25}$=$\frac{12}{100}$; $\frac{12}{100}-\frac{3}{100}=\frac{9}{100}$ net gain.
$\frac{100}{100}$=\$4500; $\frac{1}{100}$=\$45; $\frac{9}{100}$=\$405, ANS.

(75) \$240×125%=\$300; \$300÷(100%—25%)=\$400, ANS.

(76) 100%=rice; 160%=tea; 240%=coffee; 300%=sugar.
100%+160%+240%+300%=800%; 800%=\$240.
100%=\$30 rice; 160%=\$48 tea; 240%=\$72 coffee; 300%=\$90 sugar, ANS.

(77) $\frac{1}{2}$ of 100%=50%; 50%×120%=60%; 50%×90%=45%.
(60%+45%)—100%=5%; \$100÷5%=\$2000, ANS.

(78) 100%—38%=62%; 25% of 62%=15½%; 62%+15½%=77½%;
100%—77½%=22½%; 22½%=9 A; 100%=40 A, ANS.

(79) $\frac{1}{2}$ of 100%=50%; 50%×120%=60%; 50%×(100%—12½%)=43¾%.
60%+43¾%=103¾%; 103¾%—100%=3¾%.
3¾%=\$30; 100%=\$800; \$800÷300=\$2⅔, ANS.

(80) 100%÷(100%+20%)=83⅓%; 100%÷(100%—20%)=125%.
125%+83⅓%=208⅓%; 208⅓%—200%=8⅓%.
8⅓%=\$50; 100%=\$600; \$600×83⅓%=\$500 1st.
\$600÷80%=\$750 2d, ANS.

(81) 100%—10%=90%; 8¢×130%=10.4¢; 10.4¢÷90%=11⅑¢
ANS.

(82) $2.50\times46=\$115$; $\$115\times125\%=\$143.75$.
$46-6=40$ gal.; $\$143.75\div40=\$3.59\frac{3}{8}$, ANS.

(83) $\frac{11}{12}-\frac{9}{10}=\frac{1}{60}$; $\frac{1}{60}=1\frac{2}{3}\%$, ANS.

(84) $2\frac{7}{9}\%=\frac{1}{36}$; $\frac{11}{12}+\frac{1}{36}=1\frac{7}{8}$, ANS.

(85) 10% of $50\not{c}=5\not{c}$; $50\not{c}+5\not{c}=55\not{c}$.
25% of $50\not{c}=12\frac{1}{2}$c; $55\text{c}+12\frac{1}{2}\text{c}=67\frac{1}{2}$c, ANS.

(86) 10% of $(100\%+33\frac{1}{3}\%)=13\frac{1}{3}\%$; $133\frac{1}{3}\%-13\frac{1}{3}\%=120\%$.
$120\%-100\%=20\%$, ANS.

(87) $(100\%+20\%)\div(100\%-15\%)=141\frac{3}{17}\%$.
$141\frac{3}{17}\%-100\%=41\frac{3}{17}\%$, ANS.

(88) 16oz.—12oz.=4 oz.; $4\div16=25\%$, ANS.

(89) $\$238\div(100\%-20\%)=\$297.50$ 2d.
$\$297.50\div(100\%+40\%)=\$212.50$ 1st, ANS.

(90) By spending 50% of his money for 12 days he has remaining $\frac{1}{1024}$; $\frac{1}{1024}=\$1$; $\frac{1024}{1024}=\$1{,}024$, ANS.

(91) $\$2{,}400\div120\%=\$2{,}000$ gain 2d yr.
$\$2{,}000\div44\frac{4}{9}\%=\$4{,}500$ gain 1st yr., ANS.

(92) 268.8 cu. in.—231 cu. in.=37.8 cu. in.
$\frac{37.8}{231}=16\frac{4}{11}\%$ gain; $\frac{37.8}{268.8}=14\frac{1}{16}\%$ loss.
$16\frac{4}{11}\%-14\frac{1}{16}\%=2\frac{53}{176}\%$ gain, ANS.

(93) $100\%-(6\%+30\%)=64\%$; 40% of $30\%=12\%$; $30\%-12\%=18\%$.
$64\%+18\%=82\%$; $100\%+14\%=114\%$; $114\%-82\%=32\%$.
$32\%\div64\%=50\%$, ANS.

(94) $100\%=\text{C}$; $133\frac{1}{3}\%=\text{B}$; $133\frac{1}{3}\%-100\%=33\frac{1}{3}\%$.
$33\frac{1}{3}\%=\$100$; $100\%=\$300$ C; 4% of $\$300=\$12$, ANS.

(95) $100\%-25\%=75\%$; $25\%\div75\%=33\frac{1}{3}\%$, ANS.

(96) $100\%+8\%=108\%$; $108\%\times112\frac{1}{2}\%=121\frac{1}{2}\%$.
$121\frac{1}{2}\%\times(100\%-4\%)=116.64\%$; $\$1{,}166.40\div116.64\%=\$1{,}000$, ANS.

(97) $100\%-18\frac{2}{11}\%=81\frac{9}{11}\%$; 75% of $(81\frac{9}{11}\%+\$65)=61\frac{4}{11}\%+\$48\frac{3}{4}$.
$(81\frac{9}{11}\%+\$65)-(61\frac{4}{11}\%+\$48\frac{3}{4})=20\frac{5}{11}\%+\$16\frac{1}{4}$; $\$16\frac{1}{4}+\$10=\$26\frac{1}{4}$.
$100\%-20\frac{5}{11}\%=79\frac{6}{11}\%$; $79\frac{6}{11}\%=\$26\frac{1}{4}$; $100\%=\$33$, ANS.

(98) $100\%=$larger.
75% of $287=215\frac{1}{4}$; $16\frac{2}{3}\%$ of $287=47\frac{5}{6}$; $75\%-16\frac{2}{3}\%=58\frac{1}{3}\%$.
$215\frac{1}{4}+47\frac{5}{6}=263\frac{1}{12}$; $58\frac{1}{3}\%=263\frac{1}{12}$; $100\%=451$, ANS.

(99) $5\%=\$15$; $100\%=\$300$; $\$300\div\$2.50=120$, ANS.

(100) $\$.193\times10\times100=\$193$, cost.
10% of $100=10$; $100-10=90$ yds.
$\$.238\times10\times90=\$210.60$ selling price.
$\$210.60-\$193=\$17.60$ gain.
$\$17.60\div\$193=9\frac{23}{193}\%$ gain, ANS.

(101) $100\%=$B; $150\%=$A; $100\%\div150\%=66\frac{2}{3}\%$, ANS.

(102) 40% of $\$100=\$40$; $\$100+\$40=\$140$ S. P.
$100\%-12\frac{1}{2}\%=87\frac{1}{2}\%$ of asking price.
$\$140\div87\frac{1}{2}\%=\$160$, ANS.

(103) $\frac{2}{5}$ of $100=40$; 10% of $40=4$; $\frac{4}{7}$ of $100=57\frac{1}{7}$.
$4\div57\frac{1}{7}=7\%$, ANS.

(104) 36 in.—35 in.=1 in.; 1 in.$\div35=2\frac{6}{7}\%$.
$40\%+2\frac{6}{7}\%=42\frac{6}{7}\%$; $42\frac{6}{7}\%=\$330$; $100\%=\$770$, ANS.

(105) $100\%+12\frac{1}{2}\%=112\frac{1}{2}\%$; $112\frac{1}{2}\%-90\%=22\frac{1}{2}\%$.
$\$18+\$20=\$38$; $22\frac{1}{2}\%=\$38$; $100\%=\$168\frac{8}{9}$, ANS.

(106) $\$24\div(100\%-25\%)=\$32$ cost; $\$34-\$32=\$2$.
$\$2\div\$32=6\frac{1}{4}\%$ gain, ANS.

(107) $100\%=$each investment.
$100\%+25\%=125\%$ A; $\frac{1}{2}$ of $125\%=62\frac{1}{2}\%$ B.
$100\%-62\frac{1}{2}\%=37\frac{1}{2}\%$; $37\frac{1}{2}\%=\$225$; $100\%=\$600$, ANS.

(108) 10% of 120=12; 8+12=20; 5%=20; 100%=400, ANS.

(109) \$25÷(100%—16⅔%)=\$30 1st.
\$30—\$25=\$5; 16%=\$5; 100%=\$31.25 2nd, ANS.

(110) ⅛%=\$5; 100%=\$4000 cost.
\$6—\$5=\$1 gain; \$1÷\$4000=$\frac{1}{4000}$%, ANS.

(111) 160÷140=1⅛ yds., ANS.

(112) \$3÷150%=\$2; \$4—\$2=\$2; \$2÷\$4=50%, ANS.

(113) 100%—50%=50%; 6—1=5; 50÷5=10%, ANS.

(114) 100%=cost of each; 100%+20%=120% rice; 100%+10%=110% coffee.
100%—8%=92%; 120%+110%+92%=322%.
322%=\$3,864; 100%=\$1,200, ANS.

INTEREST.

(1) \$2,442.04×\$1.61051=\$3,932.9298 am't.
The sum of the compound am'ts for 4, 3, 2, 1 and 0 yrs.=\$6.1051.
\$3,932.9298÷6.1051=\$644.204, ANS.

(2) 365 da.÷73=5; \$1.00+.10=\$1.10; $\sqrt[5]{1.10}$=1.924%, ANS.

(3) ⅖ mill=.24; 100%=\$1,080, ANS.

(4) Am't of \$1 at 12% for 6 mo.=\$1.0609; \$1.0609—3¢ int.=\$1.0309.
Am't of \$1.0309 at 12% for 6 mo.—3¢=\$1.06368181.
Clearing .06368181 on each \$1; \$2,450.85÷.06368181=\$38,485.87, ANS.

(5) $750÷4=$187.50. By multiplying $187.50 by the am't of $1 at simple int. for 4, 9, 12 and 20 mo. we have $190.625, $194.531, $196.875 and $203.125, which, added together make $785.156, ANS.

(6) $4\frac{1}{2}\%$ of $180 for 8 mo.=$5.40; $180+$5.40=$185.40. $185.40—$156=$29.40 gain; $29.40÷$156=$18\frac{11}{13}\%$, ANS.

(7) The am't of the present worths of $250 for $\frac{1}{2}$, $1\frac{1}{2}$, $2\frac{1}{2}$, $3\frac{1}{2}$ and $4\frac{1}{2}$, and the remainder in 5 yrs. is $3413.08+, ANS.

(8) The sum of the present worths of $200 for 1, 2, 3, 4 and 5 mo.=$978.15, ANS.

(9) Am't of $300 at 6% for 1 yr. 10 mo.=$333. $1,500—$333=$1,167; 1 yr. 10 mo.=22 mo.; 22—6=16 mo. Pres. worth of $1,167 for 16 mo. at 6%=$1,080.56, ANS.

(10) The compound am't of $1 for 1 yr.=$1.12550881. $1.12550881—$1=12.550881%, ANS.

(11) $100 at 2% a mo. for 33 da.=$2.20; $2.20×11=$24.20. $100+$24.20=$124.20; $124.20—$106=$18.20, ANS.

(12) $3,325 at 1% for 10 mo. 24 da.=$29.925. $119.70÷$29.925=4%, ANS.

(13) 1.00÷6%=$16\frac{2}{3}$ yrs., ANS.

(14) $6,000 at 1% for 1 mo.=$5; $45÷$5=9%, ANS.

(15) $1 at 1% a mo. for 68 da.=$.02\frac{4}{15}$; $17÷$.02\frac{4}{15}$=$750, ANS.

(16) 2.00÷30 yrs.=$6\frac{2}{3}\%$, ANS.

(17) 100%—40%=60%; 100%÷60%=$1\frac{2}{3}$. $1\frac{2}{3}$ at 5% semi-annually=$16\frac{2}{3}\%$, ANS.

(18) $4.00—$1.00=$3.00; $3.00÷24=$12\frac{1}{2}\%$, ANS.

(19) Am't of $1 for 1 yr. 8 mo. 5 da.=$1.084\frac{1}{36}$. $819.45÷$1.084\frac{1}{36}$=$755.93, ANS.

(20) $1.00÷8=$12\frac{1}{2}$ yrs., ANS.

(21) 2+3=5; $\frac{3}{5}$ of \$2,640=\$1,584; \$1,584÷2=\$792 A's int.
\$1 at 6% for 5 yrs. 6 mo.=.33; \$792÷.33=\$2,400 A.
$\frac{2}{3}$ of \$2,400=\$1,600 B, ANS.

(22) \$1,480.78—\$1,374.50=\$106.28 int.
10% of \$1,374.50=\$137.45. $\frac{106.28}{137.45}$ yr.=9 mo. 8 da., ANS.

(23) 6% of \$175.12 for 1 yr.=\$10.5072.
$\frac{6.43}{10.5072}$ yr.=7 mo. 10 da., ANS.

(24) 12% of \$3,642.08=\$437.0496; \$4,007.54—\$3,642.08=\$365.46;
$\frac{365.46}{437.0496}$ yr.=10 mo. 1 da., ANS.

(25) \$100 at 2% for 63 da.=\$4.20; \$100+\$4.20=\$104.20.
.18235=int. for given time; \$4.20÷.18235=$23\frac{17}{521}$%, ANS.

(26) \$1 at 6% for 93 da.=.0155; \$1—.0155=.9845.
\$1,000÷.9845=\$1,015.74, ANS.

(27) 20% of \$100 for 63 da.=\$3.50; \$100+\$3.50=\$103.50.
1% of \$103.50 for 63 da.=.181125; \$3.50÷.181125=$19\frac{67}{207}$%, ANS.

(28) 1% of \$200 for 2 yrs.=\$4; \$48÷\$4=12%, ANS.

(29) 6% of \$1 for 2 yrs.=.12; \$48÷.12=\$400, ANS.

(30) 6% of \$1 for 6 mo. 12 da.=.032; \$640÷.032=\$20,000.
$\frac{1}{5}$=\$20,000; $\frac{5}{5}$=\$100,000, ANS.

(31) Compound int. of \$400 for 2 yrs.=\$66.56.
Annual int. of \$400 for 2 yrs.=\$66.56.
\$66.56—\$66.56=0, ANS.

(32) Compound int. for 3 yrs. at 6%=\$38.20+.
Annual int. for 3 yrs. at 6%=\$38.16.
\$38.20—\$38.16=4¢, ANS.

(33) Compound am't of $200 at 8% for 2 yrs.=$33.28.
Simple int. of $200 for 2 yrs. at 8%=$32.00.
$33.28—$32=$1.28, ANS.

(34) 37—18=19 yrs.
The sum of the compound amounts from one to 19 yrs. inclusive=$35.78+.
$25,000÷$35.78+=$698.74—, ANS.

(35) $\frac{2}{3}$ of A's=$\frac{3}{4}$ of B's; $\frac{3}{3}$=$\frac{9}{8}$; $\frac{8}{8}+\frac{9}{8}=\frac{17}{8}$; $\frac{17}{8}$=$3,213.
$\frac{8}{8}$=$1,512 B; $\frac{9}{8}$=$1,704 A's; 8% of $1 for 3 yrs. 9 mo.=.30;
$1,704÷.30=$5,680 A's; $1,512÷.30=$5,040 B's, ANS.

(36) Am't of $1 for 2 yrs. at 5%=$1.10; $4,950÷$1.10=$4,500.
$\frac{7}{7}$ of $\frac{4}{5}=\frac{28}{35}$; $\frac{4}{5}+\frac{8}{35}=\frac{36}{35}$; $4,500÷$\frac{36}{35}$=$4,375 farm.
$\frac{35}{35}=\frac{8}{35}$; $\frac{5}{5}=\frac{8}{21}$; $\frac{8}{21}$ of $4,375=$1,666$\frac{2}{3}$ house, ANS.

(37) $1 at 8% for 6 yrs.=.48; $960÷.48=$2,000.
$\frac{2}{2}+\frac{1}{2}=\frac{3}{2}$; $2,000×$\frac{3}{2}$=$3,000 B.
$\frac{1}{2}$ of $3,000=$1,500; $1,500÷3=$500; $\frac{2}{3}$=$500; $\frac{3}{3}$=$750 A, ANS.

(38) Amount at simple int. of $1 for 6 yrs. at 4%=$1.24.
$744÷$1.24=$600.
$\frac{2}{3}+\frac{3}{3}=\frac{5}{3}$; $\frac{5}{3}$=$600; $\frac{3}{3}$=$360 A.
$\frac{2}{3}$ of $360=$240, which is as 2 : 3.
Then $\frac{2}{3}$=$240; $\frac{3}{3}$=$360, ANS.

(39) $13×6%=.78; $\frac{.975}{.78}$=1 yr. 3 mo., ANS.

(40) 2 mo.=$\frac{1}{6}$ yr.; $\frac{1}{6}$=$3.25; $\frac{6}{6}$=$19.50; $19.50÷$325=6%, ANS.

(41) $68—$67=$1; 5%—4%=1%; $1.00÷1%=$100 difference.
$68+$67=$135; 5%+4%=9%; $135÷9%=$1,500 am't.
$1,500—$100=$1,400; $1,400÷2=$700; $700+$100=$800.
$700 and $800, ANS.

(42) $1 at 5% for 9 mo.=.0375; $1 for 15 mo. at 4%=.05.
.05—.0375=.0125; $150÷.0125=$12,000, ANS.

(43) $1.00÷16 yrs.=6$\frac{1}{4}$%, ANS.

(44) \$612—\$558=\$54; $4\frac{1}{2}$ yrs.—3 yrs.=$1\frac{1}{2}$ yrs.
\$54÷$1\frac{1}{2}$ yrs.=\$36 int. for one year; 3 yrs.=\$108.
\$558—\$108=\$450 prin.; \$36÷\$450=8%, ANS.

(45) $\frac{5}{5}$=prin.; $\frac{5}{5}-\frac{2}{5}=\frac{3}{5}$; $\frac{3}{5}$=\$120; $\frac{5}{5}$=\$200 prin.
$\frac{2}{5}$ of \$200=\$80, ANS.

(46) $\frac{5}{5}$=prin.; $\frac{5}{5}-\frac{1}{5}=\frac{4}{5}$; $\frac{4}{5}$=\$120; $\frac{5}{5}$=\$150, ANS.

(47) $\frac{5}{8}$=int. for 5 yrs.; $\frac{1}{5}$ of $\frac{5}{8}=\frac{1}{8}$ int. for 1 yr.; $\frac{1}{8}=12\frac{1}{2}$%, ANS.

(48) \$1.00=prin.; \$1 at $3\frac{1}{2}$% for 8 yrs.=.28; $\frac{1}{7}$ of .28=.04; .04÷\$1.00=$\frac{1}{25}$, ANS.

(49) For 1 yr. it is $\frac{1}{15}$ of $\frac{3}{5}=\frac{1}{25}$; $\frac{1}{25}=4$%, ANS.

(50) \$1 at 11% for 9 yrs.=.99; \$1+.99=\$1.99; \$597÷\$1.99=\$300.
\$663—\$300=\$363; \$300 at 11% for 1 yr.=\$33.
\$363÷\$33=11 yrs., ANS.

(51) .25×365=\$9.125; \$9.125÷\$1,460=$6\frac{1}{4}$%, ANS.

(52) $\frac{5}{8}$ of \$723.16$\frac{1}{2}$ = \$451.978$\frac{1}{8}$; $7\frac{1}{2}$% of \$723.16$\frac{1}{2}$ = \$54.2373$\frac{3}{4}$;
$\frac{451.978\frac{1}{8}}{54.2373\frac{3}{4}}$=8 yrs. 4 mo., ANS.

(53) \$345—\$790=\$55; 19—8=11 mo.; \$55÷11=\$5.
\$5×12=\$60 int. for 1 yr.; \$5×9=\$45.
\$345—\$45=\$800; \$60÷\$800=$7\frac{1}{2}$%, ANS.

(54) (\$139×600)—(\$600×139)=0, ANS.

(55) $\frac{7}{7}+\frac{1}{7}=\frac{8}{7}$; $\frac{8}{7}$=\$640; $\frac{7}{7}$=\$560, ANS.

(56) \$4—\$1=\$3; \$3÷20 yrs.=15%, ANS.

STOCKS AND BONDS.

(1) $\$100\times32=\$3200$; $\$3200\times(100\%-15\frac{1}{4}\%)=\$2712$, ANS.

(2) $18\times\$500=\$9000$; $100\%-28\%=72\%$;
$102\%-72\%=30\%$ loss; $\$9000\times30\%=\$2700$, ANS.

(3) $100\%-4\frac{1}{2}\%=95\frac{1}{2}\%$; $\$4775\div95\frac{1}{2}\%=\$5000$;
$\$5000\div\$100=50$, ANS.

(4) $6\%\div75\%=8\%$; $100\%+8\%=108\%$;
$\$16200\div108\%=\$15000$; $\$16200-\$15000=\$1200$;
$\$1200\times75\%=\$900$, ANS.

(5) $6\%\div90\%=6\frac{2}{3}\%$, ANS.

(6) $7\%=8\%$; $100\%=114\frac{2}{7}\%$, ANS.

(7) $8\%=6\%$; $100\%=75\%$, ANS.

(8) $\$2000\div\frac{8\%}{130\%}=\$32500$. ANS.

(9) $\$120\times\$10=\$1200$; $\$1200\times(\frac{2}{3}\%+1\frac{1}{3}\%)=\$23$, ANS.

(10) $(100\%+2\%)\div(100\%+20\%)=85\%$; $100\%-85\%=15\%$. ANS.

(11) $6\%\div37\frac{1}{2}\%=16\%$, ANS.

(12) $4\%+5\%=9\%$ gain; $9\%=\$450$; $100\%=\$5000$;
$\$5000\div\$50=100$, ANS.

(13) $\$6894\div(95\frac{5}{8}\%+\frac{1}{8}\%)=\$7200$, ANS.

(14) $100\%-25\%=75\%$ cost;
$100\%+20\%=120\%$ S. P.; $120\%-75\%=45\%$;
$45\%\div75\%=60\%$, ANS.

(15) $100\% - 30\% = 70\%$.
I realize $4\% + 4\%$ or 8% on each share per annum.
$8\% \div 70\% = 11\frac{3}{7}\%$, Ans.

(16) $\$250 \times \$100 = \$25000$; $\$25000 \times 6\% = \$1500$;
$\$25000 \times 70\% = \$17500$; $\$17500 \times (8\% \div 120\%) = \$1166\frac{2}{3}$;
$\$1500 - \$1166\frac{2}{3} = \$333\frac{1}{3}$, Ans.

(17) $4\frac{1}{2}\%$ of $\$100 = \$4.50$; $\$100 - \$4.50 = \$95.50$;
$\$4775 \div \$95.50 = 50$, Ans.

(18) $\$100 \times 50 = \$5000$; $\frac{1}{2}\%$ of $\$5000 = \$25$.
$\$2348.20 \div (\$5000 - \$25) = 47\frac{1}{5}\%$, Ans.

(19) $6\% \div 90\% = 6\frac{2}{3}\%$.
$15\% \div 6\frac{2}{3}\% = 2\frac{1}{4}$.
$100\% \times 2\frac{1}{4} = 225\%$, Ans.

(20) $115\% \times 8\% = 9.2\%$; $9.2\% \div 90\% = 10\frac{2}{3}\%$, Ans.

(21) 6% of $\$50 = \$3$; $\$3.00 \div 8\% = \$37.50$, Ans.

(22) $\$500 \times \frac{105}{110} = \$456.52\frac{4}{23}$, Ans.

(23) $8\% = 5\%$; $100\% = 62\frac{1}{2}\%$, Ans.

(24) $\$3000 \div \frac{8}{95} = \$35625$, Ans.

(25) $(6\% \div 107\%) \times 150\% = 8\frac{44}{107}\%$, Ans.

(26) $(6\% \div 104\%) \times 129\% = 7\frac{23}{52}\%$, Ans.

(27) $105\% \times 8\% = 8.4\%$; $6\% = 8.4\%$; $100\% = 140$, Ans

(28) 5% of $\$9500 = \$475$.
$\$475 \times 1\frac{15}{2} = \$273.125$, Ans.

(29) $\$8500 \times 115\% = \$9775$, Ans.

(30) $\$21300 \div 106.5\% = \$20000$; $\$20000 \times 109\% = \$21800$:
$\$21800 - \$21300 = \$500$, Ans.

(31) $\$1. \div 105\% = \$.95\frac{5}{11} = 95\frac{5}{11}$ cents, Ans.

(32) $\$800 \times 110\frac{1}{8}\% = \$881$, Ans.

(33) Int. on \$1. at $1\frac{5}{8}\%$ for 4 intervals=\$.065—;
\$513.50÷\$.065—=\$7900, ANS.

(34) $\$1000 \div \frac{6\frac{1}{2}\%}{105\%} = \$16153.84\frac{8}{13}$, ANS.

(35) $100\% + 4\% = 104\%$; 5% of $104\% = 5.2\%$.
$104\% + 5.2\% = 109.2\%$.
\$12012÷109.2%=\$11,000.
\$11,000÷\$100=110 shares, ANS.

(36) $(\$4982 \div 106\%) \times 4\% = \$188$, ANS.

(37) $7\% \div 70 = 10\%$, ANS.

(38) $(105\% - \frac{1}{4}\%) - (95\frac{1}{4}\% + \frac{1}{4}\%) = 9\frac{1}{4}\%$;
$9\frac{1}{4}\% = \$925$; $100\% = \$10{,}000$;
\$10,000÷\$100=100, ANS.

(39) $\$1921 \div (1\frac{5}{118} \times 113\%) = \$40120$, ANS.

(40) $\$100 \times 25 = \$2500$; 5% of \$2500=\$125;
\$125÷\$2.50=50 per yr.; 10 mo.=$\frac{5}{6}$ yr.
50÷$\frac{5}{6}$=60 lamps, ANS.

(41) $25 \times \$1000 = \$25000$; $\$25000 \times (114\frac{1}{4}\% + \frac{1}{8}\%) = \$28593.75$, ANS.

(42) $\$25734.37\frac{1}{2} + \$15.62\frac{1}{2} = \$25750$;
$1\frac{1}{6}\% = \$15.62\frac{1}{2}$; $100\% = \$25000$.
\$25750÷\$25000=103%, ANS.

(43) $\$5220 \div (1\frac{1}{116} \times 105\%) = \$283.50$, ANS.

(44) $125 \times \$100 = \$12500$; $\$12500 \times (68\frac{1}{2}\% + \frac{1}{4}\%) = \$8593.75$, ANS.

(45) $\$8000 \times (108\frac{1}{4}\% + \frac{1}{8}\%) = \$8670$, ANS.

(46) $\$100 \times 55 = \$5500$; $\$5500 \times 28\frac{3}{4}\% = \$1581.25$;
\$1581.25+\$13.75=\$1,595, ANS.

(47) $\$100 \times 50 = \$5000$; $\$5000 \times 108\frac{1}{4} = \$5412.50$;
\$5418.75—\$5412.50=\$6.25;
\$6.25÷\$5000=.00125=$\frac{1}{8}$%, ANS.

(48) $35\times\$100=\$3500$; $(\$3500\times108\frac{1}{4})-(\$3500\times86\frac{1}{2})=\$761.25$, ANS.

(49) $13\frac{5}{8}\times\$100=\$13500$; $\$13500\times(100\%-15\frac{1}{2}\%)=\$11407.50$, ANS.

(50) $\$3790\div(100\%-5\frac{1}{4}\%)=\$4000$; $\$4000\div\$100=40$, ANS.

(51) 5% of $[\$4196.25\div(93\%+\frac{1}{4}\%)]=\$225$, ANS.

(52) 6% of $(\$1299\div37\frac{1}{4}\%)=\$209.23+$, ANS.

(53) $\$4,696.95\div(45\%+\frac{1}{4}\%)=\$10380$;
$\$622.80\div\$10380=6\%$, ANS.

(54) 6% of $(\$5000\div75\%)=\$400$;
5% of $(\$5000\div60\%)=\$416\frac{2}{3}$;
$\$416\frac{2}{3}-\$400=\$16\frac{2}{3}$.
5% at 60; $\$16\frac{2}{3}$ better, ANS.

(55) $\$11212.50\div112\frac{1}{8}\%=\$10000$;
6% of $\$10000\times106\frac{7}{8}\%=\$641.25$, ANS.

(56) $\left(\frac{6\%}{90\%}\right)-\left(\frac{5\%}{95\%}\times108\frac{7}{8}\%\right)=1+\%$; 6% at 90, ANS.

(57) $\frac{6\%}{90\%}-\frac{?\%}{125\%}=3\frac{1}{75}\%$; 6% at 90, ANS.

(58) $\frac{7\%}{105\%}\times\frac{6\%}{98\%}=$N. Y. 7's $\frac{80}{147}\%$, ANS.

(59) $7\%=15\%$; $100\%=214\frac{2}{7}\%$, ANS.

(60) $6\%\div90\%=6\frac{2}{3}\%$;
$225\times6\frac{2}{3}\%=15\%$, ANS.

(61) 6% of $\$5000=\$300$;
5% of $\frac{\$5000\times115}{105}=\$273.80+$;
$\$300-\$273.80+=\$26.20$ loss, ANS.

(62) $\$1.00\div125=.80$, ANS.

(63) $6\% \times 105 = 6.3\%$; $6.3\% \div (100\% - 15\%) = 7\frac{7}{17}\%$, ANS.

(64) $108 \times 7\% = 7.56\%$; $7.56 \div 6\% = 126$, ANS.

(65) $\frac{7\%}{95\%} - \frac{6\%}{85\%} = \frac{5}{323}$; $\frac{5}{323} = \$5$; $\frac{323}{323}$ or $100\% = \$1615$, ANS.

(66) $\$1500 \div 6\% = \$25000$;
$\$25000 \times (96\frac{3}{4}\% + \frac{1}{4}\%) = \$24,250$, ANS.

(67) $\$10200 \div 30\% = \$34000$. $\$34000 \times 6\% = \$2040$, ANS.

(68) $10\% \div 125\% = 8\%$, ANS.

(69) $\$1.00 \div 150\% = 66\frac{2}{3}\%$, ANS.

(70) $6\% = 7\frac{3}{10}\%$; $100\% = 121\frac{2}{3}$, ANS.

(71) 10% of $50 = $5; $9\% = \$5$; $100\% = \$55\frac{5}{9}$, ANS.

(72) $\$420 \div 105\% = \$400$.
$\$400 \times 125\% = \$500$, ANS.

(73) 6% of $200 = $12.
$\$12 \div \$150 = .08 = 8\%$, ANS.

(74) $\$29,840 \div 93\frac{1}{4}\% = \$32,000$; 6% of $32,000 = $1920.
$\$29,840 - \$240 = \$29,600$.
$\$1920 \div \$29,600 = 6\frac{8}{37}\%$, ANS.

(75) $\$8475 \div 113\% = \$7500$.
5% of $7500 = $375.
$\frac{\$375 \times 110\%}{2} = \$206.25$, ANS.

(76) 5% of $(\$7540 \div 104\%) = \$362.50$.
$\frac{1}{2}$ of $(\$362.50 \times 128\%) = \$232$, ANS.

(77) $7\frac{3}{10}\% \div 104\% = 7\frac{1}{52}\%$, ANS.

(78) $6\% = 8\%$; $100\% = 133\frac{1}{3}\%$, ANS.

(79) $\$276 \div 115\% = \$240$; $\$240 \times 2 = \$480$.
$\$480 \div \$9600 = .05 = 5\%$, ANS.

(80) $8500 × 115% = $9775, ANS.

(81) $26,250 ÷ 106½% = $24,647$\frac{6}{71}$.
$24,647$\frac{6}{71}$ × 109% = $26,866$\frac{14}{71}$.
$26,866$\frac{14}{71}$ − $26,250 = 616\frac{14}{71}$, ANS.

(82) $8000 × 110⅛% = $8810, ANS.

(83) $2240 ÷ 112% = $2000 face of stocks.
$2000 × (100% − 20%) = $1600, ANS.

(84) 100% ÷ 125% = 80%; 100% − 80% = 20%, ANS.

(85) 6% of ($6840 ÷ 95%) = $432, ANS.

(86) $11212.25 ÷ 112⅛% = $10000; 6% of $10000 = $600.
$600 × 106⅞% = $641.25, ANS.

(87) $300.87½ ÷ (20% + ⅝%) = 1458\frac{26}{33}$, ANS.

(88) .075 of 1. + .015 = .076125; .025% of .076125 = .001903125.
.001903125 ÷ 1.015 = .001875 = $\frac{3}{160}$%, ANS.

(89) 60% of 55% = 33%; 7% ÷ 33% = 21$\frac{7}{33}$%, ANS.

(90) $2700 ÷ (100% − 25%) = $3600; $3600 × 8% = $288.

$$\$288 \div \frac{10\%}{100\% - 4\%} = \$2764.80, \text{ ANS.}$$

(91) 100% − 15% = 85%; 85% × 115% = .9775.
100% − 97.75% = 2¼%, ANS.

(92) 105% ÷ (100% − 10%) = $\frac{105}{90}$; $\frac{105}{90} \div 102 = \frac{175}{153}$.
$33 ÷ 102% = 32\frac{6}{17}$; 32\frac{6}{17}$ − $11 = 21\frac{6}{17}$.
$\frac{175}{153} - \frac{153}{153} = \frac{22}{153}$; $\frac{22}{153}$ = 21\frac{6}{17}$; $\frac{153}{153}$ = $148.50, ANS.

(93) 100% − 94% = 6%; 6% = $666; 100% = $11100.
$11100 ÷ $50 = 222, ANS.

(94) 72 × $1000 = $72000; $72000 × 106¼% ÷ ($500 × 102%) = 150, ANS.

(95) 4% = $300; 100% = $7500; $7500 × 92% = $6900, ANS.

(96) 6% = $180; 100% = $3000; $3000 × 102% = $3060, ANS.

(97) $\frac{4\frac{1}{2}\%}{106\%} - \frac{4\%}{99\frac{3}{8}\%} = $ U. S. $4\frac{1}{2}$'s $1\frac{35}{59}\%$, ANS.

(98) $\$75 \times 92\% = \$69$; $\$69 \times 18 = \$1242$, ANS.

(99) $\$100 \times 15 = \$1500$; $\$1500 \times 118\% = \$1770$, ANS.

(100) $\$100 \times 9 = \$900$; $\$900 \times 85 = \$765$.
$\$100 \times 8 = \$800$; $\$800 \times 98 = \$784$.
$\$784 - \$765 = \$19$, ANS.

(101) $\$100 \times 23 = \$2300$; $\$2300 \times 102\% = \$2346$, ANS.

(102) $\$50 \times 18 = \$900$; $\frac{1}{2}\% + \frac{3}{4}\% = \frac{5}{4}\%$; $\frac{5}{4}\%$ of $\$900 = \$11.25$, ANS.

(103) $\$10 \times 120 = \$1200$; $1\frac{1}{4}\% + \frac{2}{3}\% = 1\frac{11}{12}\%$; $1\frac{11}{12}\%$ of $\$1200 = \$23$, ANS.

(104) $82\% - 65\% = 17\%$; $17\% + 5\frac{1}{2}\% = 22\frac{1}{2}\%$ gain.
$22\frac{1}{2}\% = \$1125$; $100\% = \$5000$.
$\$5000 \div \$100 = 50$ shares, ANS.

(105) $2\frac{1}{4}\% = \$945$; $100\% = \$42000$; $\$42000 \div \$100 = 420$ shares.
$86\frac{1}{4}\% - 73\% = 13\frac{1}{4}\%$; $13\frac{1}{4}\%$ of $\$42000 = \$5565$.
$\$5565 + \$945 = \$6510$ gain, ANS.

(106) $\$9040 \div 113\% = \$8000$ stock.
$5\frac{1}{2}\%$ of $\$8000 = \$440$.
$113\% - 111\frac{1}{2}\% = 1\frac{1}{2}\%$ loss.
$1\frac{1}{2}\%$ of $\$8000 = \$120$.
$\$440 - \$120 = \$320$, ANS.

DISCOUNT.

(1) 4% of \$1 for 4 yrs.=.16; 6% of \$1 for 4 yrs.=.24
\$25÷($\frac{24}{124}$—$\frac{16}{116}$)=\$449.50, ANS.

(2) Amt. of \$1 at $4\frac{1}{2}$% for 8 mos.=\$1.03.
\$156÷\$1.03=\$151.45+.
\$180÷\$151.45+=\$28.55—.
\$28.55—÷\$151.45+=$12\frac{754}{3029}$% nearly, ANS.

(3) $\frac{20}{22\frac{1}{2}}=\frac{8}{9}$; $\frac{9}{9}-\frac{8}{9}=\frac{1}{9}$; $\frac{1}{9}=11\frac{1}{9}$%; $\frac{11\frac{1}{9}}{20}=\frac{5}{9}$ yr.
$\frac{5}{9}\times 360=200$ days, ANS.

(4) $\frac{5}{6}$% a month=10% per annum.
Bank discount of \$1 for 6 mos. 3 da. at 10%=\$.0508$\frac{1}{3}$.
\$1—\$.0508$\frac{1}{3}$=\$.9491$\frac{2}{3}$.
\$4800÷\$.9491$\frac{2}{3}$=\$5057.06+, ANS.

(5) \$180+\$13.90=\$193.90.
Bank dis. on \$1 at 6% for 6 mo. 3 da.=.0305; \$1—.0305=.9695.
\$193.90÷.9695=\$200, ANS.

(6) Simple int. on \$1 for 3 yr. 4 mo.=.08$\frac{1}{3}$.
True discount=.07$\frac{9}{13}$; .08$\frac{1}{3}$—.07$\frac{9}{13}$=.00$\frac{25}{39}$=$\frac{25}{39}$% rate.
\$65—\$60=\$5; \$5÷.00$\frac{25}{39}$=\$780, ANS.

(7) 8% of \$1 for 1 yr.=.08; I wish to receive 9%.
Then $\frac{8}{9}$ must be what is left after discount is taken out;
$\frac{9}{9}-\frac{8}{9}=\frac{1}{9}=11\frac{1}{9}$ cts.
$\frac{11\frac{1}{9}}{8}$= time which equals to 1 yr, 4 mo, 20 da., ANS.

(8) $405—$30=$375.
1% of $375 for 10 mo. 20 da.=$3$\frac{1}{3}$.
$30÷$3$\frac{1}{3}$=9%, ANS.

(9) $\frac{1}{2}$ of $3275.60=$1637.80.
Int. on $1637.80 for 63 da.=$2.866.
$1637.80—$2.866=$1635.03.
$1637.80+$1635.03=$3272.83+, ANS.

(10) 31 gal. 2 qt.×50=1575 gal.
1575×$2.40=$3780.
Int. on $3780 for 93 da. at 7$\frac{1}{2}$%=$73.24—.
$3780—$73.24—=$3706.76, ANS.

(11) $1 at 8% for 100 days=.02$\frac{2}{3}$; $1+.02$\frac{2}{3}$=$1.02$\frac{2}{3}$.
$999÷$1.02$\frac{2}{3}$=$977.27+, ANS.

(12) Am't of $1 for 183 da.=$1.0305.
$185.49÷$1.0305=$180, ANS.

(13) 1% of $326.40 for 7 yr. 9 mo. 10 da.=25.386\frac{2}{3}$.
$114.24÷$25.386$\frac{2}{3}$=4$\frac{1}{2}$%, ANS.

(14) $340—$336.43=$3.57.
6% of $340 for 1 yr.=$20.40.
$\frac{3.57}{20.40}$×360=63 da.; 63—3=60, ANS.

(15) 2 yrs.=24 mo.; $45÷24=$\frac{\$45}{24}$;
24—10=14 mo.; $\frac{\$45}{24}$×14=$26$\frac{1}{4}$, ANS.

(16) 1% of $396 for 60 da.=.66.
$3.96÷.66=6%, ANS.

(17) Am't of $1 at 9% for 10 mo. 20 da.=$1.08.
$405÷1.08=$375; $405—$3.75=$30, ANS.

(18) 8% of $750 for one yr.=$60.
$\frac{8.50}{60.00}$×360=51 da.; 51—3=48, ANS.

(19) Am't of $1 at 6% for 4 yrs. 8 mo. 10 da.=1.28\frac{1}{6}$.
$1÷$1.28$\frac{1}{6}$=.78$\frac{18}{769}$; $1—.78$\frac{18}{769}$=.21$\frac{751}{769}$.
$169÷.21$\frac{751}{769}$=$769; $769—$169=$600, ANS.

(20) $2366.80+$33.20=$2400;
6% of $2400 for 1 yr.=$144.
33.20
——×360=83 da.; 83—3=80=2 mo. 20 da., ANS.
144

(21) $245—$105=$140; 8% of $140 for 1 yr.=$11.20.
105
——=9 yr. 4 mo. 15 da., ANS.
11.20

(22) $800—$792=$8; 1% of $800 for 45 da.=$1.
8÷1=8%, ANS.

(23) 6% of $1 for 63 da.=$.0105; $1—$.0105=$.9895
$1385.30÷$.9895=$1400.
$1400—$1385.30=$14.70, ANS.

(24) 1% of $2600 for 63 da.=$4$\frac{1}{20}$; $27.30÷$4$\frac{1}{20}$=6%, ANS.

(25) 6% of $1 for 63 da.=.0105; $72.66÷.0105=$6920, ANS.

(26) From Feb. 19, 1892, to Jan. 1st, 1893,=10 mos. 12 da.
Amt. of $1 at 8% for 10 mo. 12 da.=1.06\frac{14}{15}$.
From Oct. 12, 1892, to Jan. 1, 1893,=2 mos. 20 da.
6% of 1.06\frac{14}{15}$ for 2 mo. 20 da.=.0142$\frac{2}{15}$.
1.06\frac{14}{15}$—.0142$\frac{2}{15}$=$1.0551$\frac{1}{3}$.
105.51\frac{1}{3}$÷$1.0551$\frac{1}{3}$=$100, ANS.

(27) 10% on $1 for 6 mo. 3 da.=.0508$\frac{1}{3}$.
$1—.0508$\frac{1}{3}$=.9491$\frac{2}{3}$.
$1500÷.9491$\frac{2}{3}$=$1580.33, ANS.

(28) Am't of $500 at 6% for 3 yrs.=$590.
Am't of $1 at 8% for 3 yrs.=$1.24.
$590÷$1.24=$475.81—P. W.
$590—$475.81—=$114.19+Dis., ANS.

(29) Am't of $300 at 8% for 2 yrs.=$348.
Pres. worth of $348 for 2 yrs.=$310.71.
$348—$310.71=$37.29, ANS.

(30) Am't of $1 for 5 mo. at 10%=$1.04$\frac{1}{6}$;
$368.75÷$1.04$\frac{1}{6}$=$354 P. W.
$368.75—$354=$14.75 Dis., ANS.

(31) Am't of $1 at 10% for 4 mo.=$1.03$\frac{1}{3}$;
$775÷$1.03$\frac{1}{3}$=$750, ANS.

(32) Am't of $1 at 6% for 8 mo.=$1.04;
$260÷1.04=$250, ANS.

(33) 5% of $2480=$124; $2480—$124=$2356.
Am't of $2356 at 10% for 4 mo.=$2434.53+.
$2480—$2434.53=$45.47, ANS.

(34) $\frac{7}{100}-\frac{7}{107}=\frac{49}{107}\%$; $2.45÷$\frac{49}{107}\%$=$535, ANS.

(35) Am't of $1 for 10 mo. at 12%=$1.10; $1221÷$1.10=$1110.
$1122—$1110=$12, ANS.

(36) Am't of $1 at 8% for 9 mo.=$1.06.
$840.40÷$1.06=$792.83, ANS.

(37) Int. on $1 at 1$\frac{1}{2}$% a mo. for 33 da.=.0165.
$1—.0165=.9835; $1650÷.9835=$1677.68, ANS.

(38) Int. on $1 for 43 da. at 8%=$.009$\frac{5}{9}$.
$1—.009$\frac{5}{9}$=.990$\frac{4}{9}$.
$2072.60÷.990$\frac{4}{9}$=$2092.60—, ANS.

(39) 20% of $100 for 63 da.=$3.50.
Int. on any sum for 63 da. at 1%=$\frac{21}{1200}$.
$3.50÷$\frac{21}{1200}$ of $103.50=19$\frac{67}{207}$%, ANS.

(40) Am't of $1 at 25% for 1 yr.=$1.25
$1÷$1.25=.80; $1.00—.80=.20=20%, ANS.

(41) $10296÷3=$3432; the am't of the present worths of $3432 for 1, 2 and 3 yrs.=$8620
$8620—$8000=$620, ANS.

(42) Int. on $1 at 6% for 33 da.=.0055.
$1—.0055=.9945; $400÷.9945=$402.21, ANS.

(43) $\frac{6}{100}$=bank discount; $\frac{6}{106}$=true discount.
$\frac{6}{100}-\frac{6}{106}=\frac{36}{10600}=\frac{36}{106}\%$.
$3.60÷$\frac{36}{106}\%$=$1060, ANS.

EXCHANGE.

(1) 6% on $1 for 63 da.=.0105.
(1.+½%)—.0105=.9945.
$5680×.9945=$5648.76, ANS.

(2) $1+¾%=$1.00¾; int. on $1 for 33 da.=.0055.
$1.00¾—.0055=$1.002.
$1575×$1.002=$1578.15, ANS.

(3) $1+1½%=$1.01½; $1 at 6% for 63 da.=.0105.
$2625×($1.01½—.0105)=$2636.81+, ANS.

(4) Int. on $1 for 33 da. at 6%=.0055.
$500×($1.01—.0055)=$502.25, ANS.

(5) Int. on $1 for 33 da. at 6%=.0055.
$502.25÷($1.01—.0055)=$500, ANS.

(6) Int. on $1 at 8% for 63 da.=.01⅔.
$798.80÷($1.01¼—.01⅔)=$800, ANS.

(7) Int. on $1 at 6% for 33 da.=.0055.
$352.62÷($1—[1½%+.0055])=$360, ANS.

(8) $1 at 6% for 93 da =.0155.
$4800×(1.01⅜—.0155)=$4791.60, ANS.

(9) Int. on $1 at 6% for 63 da.=.0105.
$1—(.02½+.0105)=.9645.
$512.36÷.9645=$531.218+.

(10) Int. on $1 for 63 da. at 6%=.0055.
$5400×($1.005—.0055)=$5397.30, ANS.

(11) Int. on $1 for 33 da. at 6%=.0055.
$1324.74÷($1.01¾—.0055)=$1309.03, ANS.

(12) $5075—$5000=$75.
$75÷$5000=1½%, ANS.

(13) $890×101¼%=$901.12½, ANS.

(14) $1800×99%=$1782, ANS.

(15) Int. on $1 at 7% for 63 da.=.01$\frac{7}{20}$.
$1400×(102½%—.01$\frac{7}{20}$)=$1420.18⅓, ANS.

(16) Int. on $1 for 93 da. at 10%=.025$\frac{5}{6}$.
$2400×(103%—.025$\frac{5}{6}$)=$2410, ANS.

(17) Int. on $1 for 63 da. at 6%=.0105.
$1650×(.98½—.0105)=$1607.925, ANS.

(18) $7900÷101½%=$7783.25, ANS.

(19) $5000÷.98½=$5076.14, ANS..

(20) Int. on $1 for 63 da. at 6%=.0105.
$1000÷(103%—.0105)=$980.87, ANS.

(21) £87×$4.82×106%=$444.50+, ANS.

(22) $2000÷($4.85×106%)=£389 7d.+, ANS.

(23) $1505.40×(1.00—¼%)=$1501.64—, ANS.

(24) Int. on $1 for 63 da. at 6%=.0105.
$12692.50×(100¾%—.0105)=$12654.42+, ANS.

(25) $2000÷1.00⅝=$1987.58—, ANS.

(26) $4681.25÷(100%—1¼%)=$4740.51—, ANS.

(27) Int. on $1 for 21 da. at 6%=.003½.
(1.00+.005—.003½)=1.001½.
$5264.15÷1.001½=$5256.27—, ANS.

(28) Int. on $1 for 24 da. at 6%=.004.
1.00—(⅝%+.004)=.9872½.
$6836.75÷.9872½=$6925.04, ANS.

(29) Int. on \$1 for 63 da. at 6%=.0105.
$1.01\frac{1}{2}$—.0105=\$1.0045.
\$850×1.0045=\$853.825, ANS.

(30) Int. on \$1 for 33 da. at 7%=.006$\frac{5}{12}$.
\$2128.525÷(1.02—.006$\frac{5}{12}$)=\$2100, ANS.

(31) Int. on \$1 for 63 da. at 6%=.0105.
\$500×(1.00$\frac{3}{4}$—.0105)=\$498.50, ANS.

(32) Int. for 93 da. at 6%=.0155.
\$343.22÷[1.00—($\frac{1}{2}$+.0155)]=\$350.40+, ANS.

(33) Int. on \$1 for 33 da. at 6%=.0055.
\$362×(.98$\frac{1}{2}$—.0055)=\$354.58—, ANS.

(34) Int. on \$1 for 63 da. at 6%=.0105.
\$652.925÷(1.01$\frac{1}{2}$—.0105)=\$650, ANS.

(35) Int. on \$1 for 33 da. at 6%=.0055.
\$1588.595×(.98$\frac{3}{4}$—.0055)=\$1560, ANS.

(36) \$1000×100$\frac{1}{2}$%=\$1005, ANS.

(37) \$3000×101$\frac{1}{4}$%=\$3037.50, ANS.

(38) Int. on \$1 for 33 da. at 6%=.0055.
\$5000×(1.00$\frac{1}{8}$—.0055)=\$4978.75, ANS.

(39) Int. on \$1 for 93 da. at 6%=.0155.
\$1500×(.99$\frac{7}{8}$—.0155)=\$1471.875, ANS.

(40) \$5000×99$\frac{3}{4}$%=\$5985, ANS.

(41) \$3000×100$\frac{1}{8}$%=\$3003.75, ANS.

(42) Int. on \$1 for 93 da. at 6%=.0155.
\$5000×(1.00$\frac{1}{8}$—.0155)=\$4928.75, ANS.

(43) Int. on \$1 for 2 mo. at 6%=.01.
\$1500×(1.00$\frac{1}{4}$—.01)=\$1488.75, ANS.

(44) Int. on \$1 for 4 mon. at 6%=.02.
\$1500×(1.00$\frac{1}{4}$%—.02)=\$1473.75, ANS.

(45) Int. on $1 for 63 da. at 6%=.0105.
$5000×(1.00$\frac{1}{10}$—.0105)=$4952.50, ANS.

(46) $5000÷101½%=$4926.11—, ANS.

(47) $5725÷100¼%=$5710.71+, ANS.

(48) Int. on $1 for 33 da. at 6%=.0055.
$1500÷(100⅜%—.0055)=$1506.40, ANS.

(49) Int. on $1 at 9% for 63 da.=.015¾.
$1200÷(100½—.015¾)=$1213.04+.

(50) $10000÷(100%—⅛%)=$10012.51+, ANS.

(51) $1750÷100⅛=$1747.81+, ANS.

(52) Int. on $1 at 6% for 33 da.=.0055.
$3500÷(100⅛%—.0055)=$3514.93+, ANS.

(53) ($3762.50÷105½)÷$4.87=£732 6s. 2.4d.+, ANS.

(54) ($2984.38÷107½)÷$4.86=£571 4s. 6.6d.+, ANS.

(55) (3269÷5.15)×105⅜=$668.87+, ANS.

(56) (8950÷5.19)×106¼=$1832.25—, ANS.

(57) (£895 10s.÷4.87)×106⅝=$4650+, ANS.

(58) (5725÷5.20)×106¼=$1169.77+, ANS.

(59) (£585 10s. 5d.÷$4.86)×107½=$3059.05+, ANS.

(60) (£875 5s. 4d.÷$4.885)×104⅞=$4484.11+, ANS.

INSURANCE.

(1) $\frac{3}{4}$ of \$3600+$\frac{4}{5}$ of \$6000=\$7500.
(\$126—\$1)÷\$7500=$1\frac{2}{3}$%, ANS.

(2) $1\frac{1}{4}$%=\$75; 100%=\$6000.
$\frac{3}{5}$=\$6000; $\frac{5}{5}$=\$10000, ANS.

(3) $\frac{5}{8}$ of \$340000=\$212500.
$\frac{5}{8}$% of \$212500=\$1328.12+, ANS.

(4) $1\frac{1}{4}$%=\$17.25; 100%=\$1380.
$\frac{3}{5}$=\$1380; $\frac{5}{5}$=\$2300, ANS.

(5) $1\frac{1}{5}$%=\$39; 100%=\$3250.
$\frac{325}{4\,5\,5\,0}$=$\frac{5}{7}$, ANS.

(6) $2\frac{1}{4}$% of $\frac{5}{8}$ of \$24000=\$337.50.
$1\frac{1}{8}$% of $\frac{2}{3}$ of \$36000=\$270.
\$337.50+\$270=\$607.50, ANS.

(7) $\frac{5}{9}$% of \$1275=\$7.08; \$7.08$\frac{1}{3}$+\$1=\$8.08$\frac{1}{3}$, ANS.

(8) $\frac{2}{3}$ of \$4800=\$3200.
\$19.20÷\$3200=$\frac{3}{5}$%, ANS.

(9) 2% of $\frac{2}{5}$=$\frac{4}{5}$%; $2\frac{1}{2}$% of $\frac{1}{4}$=$\frac{5}{8}$%.
$\frac{4}{5}$%+$\frac{5}{8}$%=$\frac{57}{40}$%; $1\frac{1}{2}$%—$\frac{57}{40}$%=$\frac{3}{40}$%.
$\frac{5}{5}$—($\frac{2}{5}$+$\frac{1}{4}$)=$\frac{7}{20}$.
$\frac{3}{40}$%÷$\frac{7}{20}$=$\frac{3}{14}$%, ANS.

(10) \$5000+\$5000=\$10000.
$\frac{10000}{4\,5\,0\,0\,0}$=$\frac{2}{9}$; $\frac{2}{9}$=\$262.50; $\frac{9}{9}$=\$1181.25.
\$1181.25÷\$45000=$2\frac{5}{8}$%, ANS.

(11) \$19.95×5=\$99.45 annual payment.
(\$99.45×75—21)=\$5370.30, ANS.

(12) \$104.58×10=\$1045.80.
Premium is paid at the beginning of each yr. and draws interest for 10, 9, etc., yrs.=55 yrs.
Annual int. on \$104.58 at 6% for 55 yrs.=\$345.11.
\$1045.80+\$345.11=\$1390.91+, ANS.

(13) \$118÷$\frac{4}{5}$%=\$14750, ANS.

(14) \$42.30÷$\frac{9}{10}$%=\$4700.
$\frac{5}{8}$=\$4700; $\frac{8}{8}$=\$7520, ANS.

(15) $\frac{3}{5}$=\$197.13; $\frac{5}{5}$=\$328.55; $2\frac{1}{2}$%—$2\frac{1}{4}$%=$\frac{1}{4}$%;
$\frac{1}{4}$%=\$328.55; 100%=\$131420.
$\frac{1}{2}$=\$131420; $\frac{2}{2}$=\$262840, ANS.

(16) $\frac{1}{2}$ of $1\frac{3}{5}$%=$\frac{4}{5}$%; $1\frac{1}{2}$% of $\frac{1}{3}$=$\frac{1}{2}$%.
$1\frac{3}{5}$%—($\frac{1}{2}$%+$\frac{4}{5}$%)=$\frac{3}{10}$%; $\frac{3}{10}$%=\$58.11; 100%=\$19370, ANS.

(17) ($1\frac{3}{4}$% of \$8000+$2\frac{1}{8}$% of \$10000)+\$207.50=\$560.
2%=\$560; 100%=\$28000, ANS.

(18) $\frac{3}{4}$ of \$2000=\$1500; \$1500÷(100%—$1\frac{1}{2}$%)=\$1522.84, ANS.

(19) $1\frac{1}{2}$%=\$225; 100%=\$15000.
$\frac{3}{4}$=\$15000; $\frac{4}{4}$=\$20000; $\frac{1}{2}$+$\frac{2}{2}$=$\frac{3}{2}$;
$\frac{3}{2}$=\$20000; $\frac{1}{2}$=\$6666.66$\frac{2}{3}$;
$\frac{2}{2}$=\$13333.33$\frac{1}{3}$, ANS.

(20) \$325÷\$16250=2%, ANS.

(21) $1\frac{1}{4}$%=\$2475; 1000%=\$198000.
$\frac{2}{3}$=\$198000; $\frac{3}{3}$=\$297000, ANS.

(22) $2\frac{1}{2}$%=\$1657.50; 100%=\$66300.
$\frac{3}{4}$=\$66300; $\frac{4}{4}$=\$88400, ANS.

(23) $4\frac{1}{2}$%=\$400; 100%=\$8888$\frac{8}{9}$.
$\frac{2}{3}$=\$8888$\frac{8}{9}$; $\frac{3}{3}$=\$13333.33$\frac{1}{3}$, ANS.

(24) $\frac{3}{4}$% of $\frac{3}{4}$ of \$30000=\$168.75.
\$30000—(\$5000—\$168.75)=\$25168.75, ANS.

(25) 3%=$180; 100%=$6000.
$\frac{2}{3}$=$6000; $\frac{3}{3}$=$9000, ANS.

(26) $652.50÷$13500=1½%, ANS.

(27) 1¼%=$175; 100%=$14000, ANS.

(28) $21.10×5=$105.50, ANS.

(29) $123.90÷$5000=2$\frac{39}{50}$%, ANS.

(30) $\frac{3}{4}$ of $150000=$112500.
$\frac{3}{5}$% of $\frac{1}{5}$ of $112500=$135.
$\frac{3}{4}$% of $\frac{1}{4}$ of $112500=$210.93.
$112500—($28125+$22500)=$61875.
$\frac{3}{5}$% of $61875=$371.25.
$135+$210.93+$371.25=$717.18, ANS.

(31) 2¼% of $6000=$135 prem.
65$\frac{3}{4}$% of $6000=$3945.
$3947—$135=$3810, ANS.

(32) $1.10×1500=$1650 cost.
$1.20×1500=$1800.
(2½% of $1800)+$1650=$1695.
$1800—$1695=$105, ANS.

(33) $\frac{3}{4}$% of $100000=$750.
$\frac{7}{8}$% of $60000=$525.
$750—$525=$225, ANS.

(34) 3%=$378; 100%=$12600, ANS.

(35) $1950÷(100%—2½%)=$2000, ANS.

(36) 9700×$1.20=$11640.
$11640÷(100%—3%)=$1200, ANS.

(37) $2600÷(100%—$\frac{7}{10}$%)=$2618.26+, ANS.

TAXES.

(1) $\$486250 \times .00\frac{78}{100} = \$3792.75$, ANS.

(2) $\$3800 \times .00\frac{78}{100} = \$29.64$; $\$29.64 + \$1 = \$30.64$, ANS.

(3) $\$1.50 \times 3 = \$4.50$; $\$53.46 - \$4.50 = \$48.96$.
$\$48.96 \div \$8704 = 53\frac{1}{4}$c. on $\$100$, ANS.

(4) $2\frac{1}{2}\% = \$26.04$; $100\% = \$1041.60$ income.
$16\% = \$1041.60$; $100\% = \$6510$, ANS.

(5) $\$7592 \div (100\% + 2\%) = \$7450$, ANS.

(6) $\$1.35 = 1.35\%$ on the dollar.
$\$125127.66 \div (100\% - 1.35\%) = \$126840$ cap.
1.35% of $\$126840 = \$1712.34$ tax, ANS.

(7) $1024 \times \$1 = \$1024$.
$\$4000 - \$1024 = \$2976$.
$\$2976 \div 2.4$ mills $= \$1240000$, ANS.

(8) $\$4300 + \$1940 = \$6240$.
$\$33.20 - \$2 = \$31.20$.
$\$31.20 \div \$6240 = \frac{1}{2}\%$, ANS.

(9) $3\frac{6}{10}\%$ of $\$6748950 = \$242962.20$ amount.
$1\frac{1}{2}\%$ of $\$242962.20 = \$3644.43+$ fees, ANS.

DUTIES OR CUSTOMS.

(1) 111+112+113=336 lbs.; 5% of 336=16.8.
(336—16.8)×$.05=$15.96, ANS.

(2) 250 lbs.×20=5000 lbs.; 6¼% of 5000 lbs.=312.5 lbs.
(5000—312.5)×$.20=$9375; 4% of $9375=$37.50, ANS.

(3) 3724 yds.×10c.=$372.40.
11% on 3724×23c.=$94.217.
$372.40+$94.217=$466.617.
$466.617×(100%—10%)=$419.96—, ANS.

(4) 45×36×$1.25=$2025.
2% of $2025=$40.50; $2025—$40.50=$1984.50.
40% of $1984.50=$793.80, ANS.

(5) 98×12=1176; 10% of 1176=117.6.
(1176—117.6)×$.05=$52.92, ANS.

(6) 668×36=24048; ⅛ of 24048=3435.42+.
(24048—3435.42+)×$.02½=$515.31+, ANS.

(7) 30% of (40×3⅝×.75)=$35.07+, ANS.

(8) 760 lbs.×30=22800 lbs.; 12% of 22800 lbs.=2736 lbs.
22800 lbs.—2736 lbs.=20064 lbs.
(20064 lbs.÷100)×$1.20=$240.76+, ANS.

(9) $631.43—$53.34=$578.09.
2% of 1680 lbs.=33.4; 1680—33.4=1646.6.
$578.09÷(1646.6×115%)=30+cts., ANS.

(10) $7389.03—$73.80=$7315.23.
$7315.23÷130%=$5627.10, ANS.

(11) $60\times54\times\$1.80=\$5832.$
$60\times54\times\$.25=\$810.$
5% of $5832=$291.60.
20% of ($5832—$291.60)=$1108.08.
$5832+$810+$1108.08+$8.50=$7758.58, ANS.

(12) $50\times220=11000$ lbs.; 4% of 11000=440 lbs.
$(11000—440)\times\$.05=\$528.$
$184.80\div\$528=35\%$, ANS.

(13) 540×160 lbs.=86400 lbs.
3½% of 86400=3024; 86400—3024=83376 lbs.
$83376\times\$.09=\$7503.84$; 15% of $7503.84=$1125.57+. ANS.

(14) 28% of $(25\times24\times45\times\$1.13)=\$8542.80$, ANS.

(15) $12\times42\times\$1.30=\$655.20.$
5% of $655.20=$32.76.
31½% of ($655.20—$32.76)=$196.07—, ANS.

(16) $40\times160=6400$ yds.
20%=$1024; 100%=$5120.
$5120\div6400=80c.$, ANS.

(17) $20\times25\times.10=\$50.$
15% of $50=$7.50.
6% of ($50—$7.50)=$2.55, ANS.

(18) $2240\times7\times\$.17\times20\%=\$533.12$, ANS.

(19) $20\times63=1260$ gal.
5% of 1260=63 gal.
$(1260—63)\times\$.09=\$107.73$, ANS.

(20) $10\times145=1450$ lbs.; 8% of 1450=116 lbs.
$(1450—116)\times.06\frac{3}{4}=\$90.04+$, ANS.

(21) $45\times120=5400$ lbs.
10% of 5400=540 lbs.; 5400—540=4860.
$4860\times\$.10=\$486$, ANS.

(22) $210\times190=39900$ lbs.
5% of $39900=1995$; $39900-1995=37905$ lbs.
25% of $(37905\times\$.05)=\$473.81+$, ANS.

(23) 40% of $(15\times25\times35\times\$3.95)=\$20737.50$, ANS.

(24) $20\%=\$40.50$; $100\%=\$202.50$.
$\$202.50\div(100\%-10\%)=\$225$.
$15\times12=180$ doz.; $\$225\div180=\$1.25$, ANS..

(25) $25\%=\$337.50$; $100\%=\$1350$;
$\$1350\div100\times18=75$c. invoiced.
$.75\times125\%\times120\%=\$1.12\frac{1}{2}$ S. P., ANS.

(26) $35\%=\$806.12$; $100\%=\$2303.17+$invoiced;
$\$2303.17+\times135\%=\$3109.27+$cost, ANS.

(27) $\$1473.80\div\$3684.50=40\%$, ANS.

PROPORTION.

(1) $8.4:4.95::9\frac{1}{3}:5\frac{1}{2}$, ANS.

(2) $1\frac{1}{4}:9\frac{1}{9}::1\frac{1}{8}:8\frac{1}{5}$, ANS.

(3) $\frac{3}{7}:\frac{9}{14}::\frac{3}{5}:\frac{9}{10}$, ANS.

(4) $(35-14):35::24:40$, ANS.

(5) $\frac{2}{5}\times\frac{1}{8}=\frac{1}{20}$, ANS.

(6) $6\div1\frac{1}{5}=5$, ANS.

(7) $7000:5760::1:1\frac{44}{175}$, ANS.

(8) $(3\times5:4\times9)-(1\times2:6\times7)=\frac{31}{84}$, ANS.

(9) $(7\frac{1}{2}\div4\frac{2}{3})-(4\frac{2}{3}\div7\frac{1}{2})=1\frac{241}{280}$, ANS.

(10) $2\frac{1}{4}\times6\frac{1}{2}=14\frac{5}{8}$, ANS.

(11) $2\frac{1}{4} \div 6\frac{1}{2} = \frac{9}{26}$, ANS.

(12) $\frac{1}{5}$=ratio; divisor 5 times the dividend.
Then there are 4 parts excess.
Then 4 : 1 : : 1 : $\frac{1}{4}$, ANS.

(13) $\frac{1}{2} : 1\frac{1}{2} : : 40 : 120$; 120—48=72 lbs., ANS.

(14) $\frac{1}{2}$ of $(3\frac{1}{2} - \frac{1}{15}) = 1\frac{43}{60}$.
$3\frac{1}{2} - 1\frac{43}{60} = 1\frac{47}{60}$, ANS.

(15) Their money is as 1, 3 and 12;
1+3+12=16.
$\frac{1}{16}$ of \$3456=\$216 C; $\frac{3}{16}$=\$648 B; $\frac{12}{16}$=\$2592 A, ANS.

(16) $\frac{3}{4} = \frac{5}{7}$; $\frac{4}{4} = \frac{20}{21}$; 20+21=41.
$\frac{20}{41}$ of 2255=1100 A; $\frac{21}{41}$=1155 B, ANS.

(17) $\frac{7}{9} = \frac{6}{7}$; $\frac{9}{9} = \frac{54}{49}$; $\frac{54}{49} - \frac{49}{49} = \frac{5}{49}$.
$\frac{5}{49}$=120; $\frac{49}{49}$=1176;
$\frac{54}{49}$=1296, ANS.

(18) $\frac{3}{4} = \frac{5}{6}$; $\frac{4}{4} = \frac{10}{9}$; $\frac{10}{9} + \frac{9}{9} = \frac{19}{9}$;
$\frac{19}{9} = 1\frac{7}{12}$; $\frac{9}{9} = \frac{3}{4}$;
$\frac{10}{9} = \frac{5}{6}$. $\therefore \frac{3}{4}$ and $\frac{5}{6}$, ANS.

(19) $\frac{4}{5} = 1\frac{1}{2}$; $\frac{5}{5} = \frac{15}{8}$; $\frac{15}{8} - \frac{8}{8} = \frac{7}{8}$.
$\frac{7}{8}$=\$637; $\frac{8}{8}$=\$728 John.
$\frac{15}{8}$=\$1365 James, ANS.

(20) 5+8=13; $\frac{5}{13}$ of 13650=5250 B's.
$\frac{8}{13}$=8400 A's, ANS.

(21) The cost of the house, farm and store are to each other as 1, 3 and 6.
1+3+6=10.
\$450+\$650=\$1100.
\$28100—\$1100=\$27000.
$\frac{1}{10}$ of \$27000=\$2700 house,
$(\frac{3}{10}$ of \$27000)+\$450=\$8550 farm;
$(\frac{6}{10}$ of \$27000)+\$650=\$16450 store, ANS.

PARTNERSHIP.

(1) $\frac{5}{25}$ of \$300=\$60 A; $\frac{12}{25}$ of \$300=\$144 B; $\frac{8}{25}$ of \$300=\$96 C, ANS.

(2) 16+14+12=42; $\frac{16}{42}$ of \$1200=\$457$\frac{1}{7}$ X.
$\frac{14}{42}$ of \$1200=\$400 Y; $\frac{12}{42}$ of \$1200=\$342$\frac{6}{7}$ Z, ANS.

(3) \$18000+\$6000+\$10000=\$34000.
\$34000×(100%−30%)=\$23800.
\$23800×150%=\$35700; \$35700−\$34000=\$1700.
$\frac{18}{34}$ of \$1700=\$900 A; $\frac{6}{34}$ of \$1700=\$300 B; $\frac{10}{34}$ of \$1700=\$500 C, ANS.

(4) \$2250−(\$800+\$1000)=\$450 C's gain.
\$450÷\$3000=15% gain; 15%=\$800; 100%=\$5333$\frac{1}{3}$ A's;
15%=\$1000; 100%=\$6666$\frac{2}{3}$ B's, ANS.

(5) \$6500+\$8000+\$5500=\$20000.
$\frac{65}{200}$ of \$12000=\$3900 sons; $\frac{8}{20}$ of \$12000=\$4800 wife;
$\frac{55}{200}$ of \$12000=\$3300 daughters, ANS.

(6) \$5000+\$6500+\$4500+\$2500+\$600=\$19100.
\$23000−\$19100=\$3900.
$\frac{5}{16}$ of \$3900=\$1218.75 A; $\frac{65}{160}$ of \$3900=\$1584.37$\frac{1}{2}$ B;
$\frac{45}{160}$ of \$3900=\$1096.87$\frac{1}{2}$ C, ANS.

(7)
3×16= 48
5×20=100
7×10= 70
218

$\frac{48}{218}$ of \$87.20=\$19.20 X
$\frac{100}{218}$ of \$87.20=\$40 Y
$\frac{70}{218}$ of \$87.20=\$28
\$87.20÷218=40¢ per week, ANS.

(8) \$4200+\$3600+\$4500=\$12300.
$\frac{42}{123}$ of \$2706=\$924 A; $\frac{36}{123}$ of \$2706=\$792 B;
$\frac{45}{123}$ of \$2706=\$990 C, ANS.

(9) $7\times30=210$
$5\times40=200$
$6\times32=192$
602

$\$1600-\$95=\$1505$.
$\frac{210}{602}$ of $\$1505=\$525$ A;
$\frac{200}{602}$ of $\$1505=\$500$ B;
$\frac{192}{602}$ of $\$1505=\$480$ C, ANS.

(10) $\$125\div\$625=18\frac{4}{7}\%$.
$\$810\times18\frac{4}{7}\%=\$150$; $\$125+\$150=\$275$, ANS.

(11) $\$2500\times24=\$60000$
$\$3000\times22=\$66000$
$\$126000$

$\frac{60}{126}$ of $\$2835=\$1350$ A; $\frac{66}{126}$ of $\$2835=\$1485$ B, ANS.

(12) $\$3000-\$2730=\$270$.
$10+12+14=36$; $\frac{10}{36}$ of $\$270=\$75$ A;
$\frac{12}{36}$ of $\$270=\$90$ B; $\frac{14}{36}$ of $\$270=\$105$ C, ANS.

(13) $7.5+\frac{3}{8}=7.875$.
$\frac{7.5}{7.875}$ of $756=720$; $\frac{\frac{3}{8}}{7.875}$ of $756=36$, ANS.

(14) $1\frac{2}{3}+2\frac{1}{2}=4\frac{1}{6}$; $\frac{1\frac{2}{3}}{4\frac{1}{6}}$ of $10.25=4.1$;
$\frac{2\frac{1}{2}}{4\frac{1}{6}}$ of $10.25=6.15$, ANS.

(15) $\$100\times150\%=\$150$; $50=$gain.
$\$50-(\$18+\$19)=\$13$ C's gain.
$50\%=\$18$; $100\%=\$36$ A; $50\%=\$19$; $100\%=\$38$ B.
$50\%=\$13$; $100\%=\$26$ C, ANS.

(16) $8\times23=184$
$12\times29=348$
532

$\frac{184}{532}=\frac{46}{133}$ A
$\frac{348}{532}=\frac{87}{133}$ B, ANS.

(17) $210+140=350$; $\frac{140}{350}$ of $\$50=\$20$, ANS.

(18) $80\times60=4800$
$64\times50=3200$
8000

$\frac{48}{80}$ of $\$50=\$30$ A
$\frac{32}{80}$ of $\$50=\$20$ B, ANS.

(19) $2500\times18=\$45000$
$1500\times18=\$27000$
$5000\times\ 9=\$45000$

$\$117000$

$\frac{45}{117}$ of $\$3250=\$1250$ A
$\frac{27}{117}$ of $\$3250=\$750$ B
$\frac{45}{117}$ of $\$3250=\$1250$ A, ANS.

(20) $80\times6=480$
$40\times6=240$

720 A
$100\times6=600$
$50\times6=300$

900 B
$50\times6=300$ C

$720+900+300=1920$.
$\frac{720}{1920}$ of $\$275=\$103.12\frac{1}{2}$ A
$\frac{900}{1920}$ of $\$275=\$128.90\frac{5}{8}$ B
$\frac{300}{1920}$ of $\$275=\$42.96\frac{7}{8}$ C,
ANS.

(21) $4\times3=12$
$\frac{2}{3}$ of $4\times9=24$

36 A
$5\times3=15$
$\frac{3}{4}$ of $5\times9=33\frac{3}{4}$

$48\frac{3}{4}$ B

$36+48\frac{3}{4}=84\frac{3}{4}$
36
— of $\$1695=\$720$ A
$84\frac{3}{4}$

$48\frac{3}{4}$
— of $\$1695=\$975$ B, ANS.
$84\frac{3}{4}$

(22) Capital is as 6, 4 and 3
$6\times4=24$
$3\times9=27$

51 A
$4\times13=52$ B
$3\times13=39$ C

142

$\frac{51}{142}$ of $\$1988=\$714$ A
$\frac{52}{142}$ of $\$1988=\$728$ B
$\frac{39}{142}$ of $\$1988=\$546$ C,
ANS.

(23) $\$5600\times12=\$67200$
$\$4200\times12=\$50400$

$\$16800$
$\$16800\div(12-4)=\$2100$, ANS.

(24) $404 \times 50c. = \$202$
$340 \times \$1.10 = \$374$

$\$576$

$\frac{202}{576}$ of $\$31.68 = \$11.11$ A
$\frac{374}{576}$ of $\$31.68 = \$20.57$ B, ANS.

(25) $\$7000 \times 6 = \$42000$.
$\frac{11}{11} - \frac{5}{11} = \frac{6}{11}$; $\$42000 \div \frac{6}{11} = \$77000$.
$(\$77000 - \$42000) \div \$5000 = 7$ mo., ANS.

EQUATION OF PAYMENTS.

(1) $11+10+9$, etc. to 1 mo. $= 66$ mos.
$50 paid the first of each mo. is $3300 for 1 mo.
$\$3300 \div \$600 = 5\frac{5}{6}$ mo., ANS.

(2) $\$900 - \$300 = \$600$. $\frac{600}{900} = \frac{2}{3}$;

$\frac{2}{3} = 12$. $\frac{3}{3} = 18$ mo., ANS.

(3)
$30 \times 0 = 0$
$80 \times 12 = 960$
$70 \times 24 = 1680$
$60 \times 40 = 2400$

240)5040(21 da.=Feb. 5th, ANS.

(4)
$\$300 \times 0 = 0$
$\$700 \times 72 = 50400$
$\$800 \times 144 = 115200$

1800)165600(92 da.=Aug. 1st, ANS.

(5) $500×4=2000
$600×5=3000
$400×7=2800

1500)7800(5 mo. 6 da., ANS.

(6) $ 900× 12= 10800
$1000×193=193000
$1100×255=280500

3000)484300(161.4+ or 162 da.=June 11th, ANS.

(7) $500× 4= 2000
$500×26=13000

1000)15000(15 da.=May 15th, ANS.

(8) $ 300×14= 4200
$6000×35=210000

6300)214200(34 da., ANS.

(9) $2000×4= 8000 $10500×6=$63000
$4500×2= 9000 6500 17000

$6500 17000 4000)46000(11½ mo., ANS.

(10) ¼ of $10000=$2500
⅕ of $10000=$2000
$2500× 6= 15000
$2000×18= 36000
$5500×30=165000

10000)216000(21⅗ mo.=1 yr. 9 mo. 18 da., ANS.

(11) $ 600× 5 = 3000
$1000×10 =10000
$1200× 7⅚= 9400

2800)22400(8 mo., ANS.

(12) $ 300×4= 1200
$ 800×5= 4000
$1000×8= 8000

2100)13200(6$\frac{2}{7}$ mo., ANS.

(13) $300×30= 9000
$600×60= 36000
$900×90= 81000

1800)126000(70 da.=Aug. 10th, ANS.

(14) $840× 0= 0 $840—($400+$200)=$240
$400×94=37600 50200÷$240=209 da.
$200×63=12600 209 da. after Oct. 3rd is Apr. 30th next yr., ANS.
50200

(15) $\frac{1}{3}$ of $12000=$4000 $12000—$4000=$8000
$\frac{1}{4}$ of $8000=$2000 $8000—$2000=$6000
$\frac{1}{2}$ of $8000=$4000 $4000×3=$12000
$4000×6=$24000
$36000
$36000÷6000=6. 6÷3=2 mo., ANS.

(16) $ 300×10= 3000 $600×0= 0
$ 500×25=12500 $550×1= 550
$1000×40=40000 $650×2=1300
1850
1850)55500(30 da., ANS.

(17) $1 \times \frac{3}{4} = \frac{3}{4}$
$\frac{1}{2} \times 6 = 3$
$\frac{1}{4} \times 8 = 2$
$1)5\frac{3}{4}(5\frac{3}{4}$ mo., ANS.

(18) $400×6=2400
$600×8=4800
7200 7200÷900=8 mo., ANS.

(19) $200×4= 800
$200×2= 400
1200 1200÷200=6 mo., ANS.

ALLIGATION.

(1) 3×10= 30
5× 8= 40
2×15= 30
10)100(10 cts., ANS.

(2)
$$12\left|\begin{array}{|c|c|c|}\hline 10 & 2 & 4 \\ \hline 13 & 1 & 2 \\ 15 & 3 & 2 \\ \hline\end{array}\right|$$
ANS.

(3)
$$7\tfrac{1}{2}\left|\begin{array}{|c|c|c|}\hline 5 & 2\tfrac{1}{2} & 1 \\ 6 & 1\tfrac{1}{2} & 5 \\ 7 & \tfrac{1}{2} & 5 \\ \hline 10 & & \\ & 2\tfrac{1}{2} & 5 \\ \hline\end{array}\right|$$
ANS.

(4)
$$16\left|\begin{array}{|c|c|c|}\hline 12 & 4 & 1 \\ 15 & 1 & 2 \\ \hline 18 & 2 & 1 \\ 20 & 4 & 1 \\ \hline\end{array}\right|$$
ANS.

(5) NOTE.—A simple solution for problems of alligation medial is to write the differences conversely opposite the numbers compared, as,
$$4\left|\begin{array}{|c|c|}\hline 3 & 3 \\ \hline 7 & 1 \\ \hline\end{array}\right|$$
which shows that for every 3 at 3 cts., 1 at 7 cts. must be taken.

$$13\left|\begin{array}{|c|c|c|}\hline 8 & 2 & \\ 12 & & 2 \\ \hline 15 & 5 & 1 \\ \hline\end{array}\right| \quad \begin{array}{rl} 2 & 1\times 25 \\ 2 & 1\times 25 \\ = & = \\ 6 & 3\times 25 \text{ ANS.} \end{array}$$

(6)
$$67\left|\begin{array}{|c|c|c|}\hline 60 & 3 & \\ 62 & & 3 \\ 65 & & 3 \\ \hline 70 & 7 & 5 \\ \hline\end{array}\right| \quad \begin{array}{l} 3\times 5=15 \\ 3\times 5=15 \\ 3\times 5=15 \\ \\ 14\times 5=70 \end{array}$$
70÷14=5 ANS.

(7)
$$80\left|\begin{array}{c|c|c|c} 95 & 15 & 6 & \\ 90 & 10 & 3 & \\ \hline 0 & 80 & 1\frac{1}{2} & \end{array}\right.$$
ANS.

(8)
$$10\left|\begin{array}{c|c|c} 8 & 2 & 150 \text{ at } 8\not{\text{c}} \\ 9 & 1 & 60 \text{ “ } 9\not{\text{c}} \\ \hline 12 & 2 & 30 \text{ “ } 12\not{\text{c}} \\ 15 & 5 & 60 \text{ “ } 15\not{\text{c}}, \text{ ANS.} \end{array}\right.$$

(9) $\$450 \div 5 = \$90$
$\$90 \div 10 = \$9$
$$9\left|\begin{array}{c|c|c} 5 & 4 & 6 \\ \hline 15 & 6 & 4 \end{array}\right.$$
ANS.

(10) $\$33 \div 100 = 33$ cts.
$$33\left|\begin{array}{c|c|c|c} 28 & 5 & 5 & \frac{5}{25} \text{ of } 100 = 20 \\ 30 & 3 & 3 & \\ \hline 35 & 2 & 17 & \frac{3}{25} \text{ of } 100 = 12 \\ & & \overline{25} & \frac{17}{25} \text{ of } 100 = 68 \end{array}\right.$$
ANS.

(11) $\$48 \div 60 = 80\not{\text{c}}$.
$$80\left|\begin{array}{c|c|c|c} 30 & 50 & 10 & 1 \\ 40 & 40 & 8 & 1 \\ \hline 85 & 5 & 1 & 2 \\ & & & 4 \end{array}\right.$$
$\frac{1}{4}$ of 80 = 20 chickens.
$\frac{1}{4}$ of 80 = 20 ducks.
$\frac{2}{4}$ of 80 = 40 geese, ANS.

(12) $\$1 \times 5 = \$5$; $\$5 + \$.04 = \$5.04$; $\$5.04 \div 7 = 72$ cts., ANS.

(13)
4 gal. of whiskey	$2.00
$\frac{1}{2}$ “ “ alcohol	.80
1 “ “ water	0
$5\frac{1}{2}$	$2.80

$\$2.80 \div 5\frac{1}{2} = 50\frac{10}{11}$ cts.
ANS.

(14)
$$7\left|\begin{array}{c|c|c} 3 & 4 & 1 \\ 5 & 2 & 1 \\ \hline 10 & 3 & 2 \end{array}\right.$$
ANS.

(15)
$15 \div 7\frac{3}{4}$	$= 1.935$
$\frac{1}{4} \div 10\frac{1}{2}$	$= .024$
$8 \div 6\frac{7}{8}$	$= 1.163$
$23\frac{1}{4}$	3.122

$23\frac{1}{4} \div 3.122 = 7\frac{9}{20}$—, ANS.

ARITHMETICAL PROGRESSION.

(1) $3\times(19-1)+50=\$1.04$, ANS.

(2) $2\times(20-1)=38$; $94-38=56$, ANS.

(3) $\frac{7}{12}\times(37-1)=21$; $21+43=64$, ANS.

(4) $\$80\times11=\$880$; $\$939-\$880=\$59$.
$\$939+\$59=\$998$; $\$998\times12=\$11976$.
$\$11976\div2=\$5988$, ANS.

(5) First term 4; com. diff. 4; numb. terms 100. $(100-1)\times4=396$; $4+396=400$ last term.
$\frac{(400+4)\times100}{2}=20200$ yds.$=11\frac{2}{44}$ mi., ANS.

(6) $(1000-1)\times10=9990$; $9990+10=10000$ last term.
$\frac{1}{2}$ $(\$100.00+\$.10)\times1000=\$50050$, ANS.

(7) $(10-1)\times10=\$90$; $90+20=110$;
$\frac{1}{2}$ $(110+20)\times10=\$650$, ANS.

(8) $(10-1)\times1\frac{1}{2}=13.5$; $13.5+2.5=16$ in., ANS.

(9) $\frac{(4+49)\times10}{2}=265$, ANS.

(10) 3 yrs. 10 mos.$=46$ mos.
$60-21=39$; $20-5=15$.
$39\div15=2\frac{3}{5}$ com. diff.
$(5-1)\times2\frac{3}{5}=10\frac{2}{5}$.
$21-10\frac{2}{5}=10\frac{3}{5}$ first payment.
$(46-1)\times2\frac{3}{5}=\$108$; $\$108+\$10.60=\$118.60$ last payment.
$\frac{1}{2}$ $(10.60+118.60)\times46=\$2971.60$, ANS.

GEOMETRICAL PROGRESSION.

(1) $(\frac{3}{4})^4 \times 96 = 30\frac{3}{8}$ mi., Ans.

(2) $192 \div 128 = 1\frac{1}{2}$ ratio;
$(1\frac{1}{2})^6 \times 128 = 1458$, Ans.

(3) $\frac{9}{10} =$ ratio; $\frac{20}{(1-\frac{9}{10})} = 200$ rds., Ans.

(4) $(2)^{(20-1)} = 524288$.
$\frac{1}{2} \times 524288 = 262144$ last term.
$(262144 \times 2) - \frac{1}{2} = 524287\frac{1}{2}$.
$524287\frac{1}{2} \div (2-1) = 524287\frac{1}{2}$ cts. $= \$5242.87\frac{1}{2}$, Ans.

(5) 9th term = 7th term; $(6)^6 = 46656$.
$16 \times 46656 = 746496$, Ans.

(6) $(\frac{3}{4})^7 \times 1024 = 136\frac{11}{16}$, Ans.

(7) $1 \div (1-\frac{1}{2}) = 2$, Ans.

(8) $\frac{7}{8} \div (1-\frac{6}{7}) = 8\frac{1}{8}$, Ans.

(9) $512 \div 8 = 64$. $\sqrt[3]{64} = 4$, Ans.

(10) $27 \times 3 = 81$. $\sqrt{81} = 9$, or $\sqrt[3-1]{27 \div 3} = 3$; $3 \times 3 = 9$, Ans.

(11) $32 \div 4 = 8$. $\sqrt[3]{8} = 2$.
$4 \times 2 = 8$;
$8 \times 2 = 16$. 8 and 16, Ans.

TIME.

(1) $\frac{2}{5}=\frac{5}{5}$; $\frac{5}{5}=\frac{25}{10}$; $\frac{25}{10}-\frac{10}{10}=\frac{15}{10}$; $12\div\frac{15}{10}=8$ o'clock P. M., ANS.

(2) $\frac{1}{2}=\frac{2}{2}$; $\frac{2}{2}=\frac{4}{2}$; $\frac{4}{2}+\frac{2}{2}=\frac{6}{2}$; $12\div\frac{6}{2}=4$ o'clock P. M., ANS.

(3) $\frac{5}{11}=\frac{11}{11}$; $\frac{11}{11}=\frac{121}{55}$; $\frac{121}{55}-\frac{55}{55}=\frac{66}{55}$; $12\div\frac{66}{55}=10$ o'clock A. M., ANS.

(4) $\frac{5}{11}=\frac{11}{11}$; $\frac{11}{11}=\frac{121}{55}$; $\frac{121}{55}+\frac{55}{55}=\frac{176}{55}$.
$12\div\frac{176}{55}=45$ min. past 3 P. M., ANS.

(5) $\frac{3}{5}=\frac{3}{10}$; $\frac{5}{5}=\frac{1}{2}$; $\frac{1}{2}+\frac{2}{2}=\frac{3}{2}$; $12\div\frac{3}{2}=8$.
12—8=4 o'clock P. M., ANS.

(6) $\frac{12}{12}-\frac{1}{12}=\frac{11}{12}$; $35\div\frac{11}{12}=38\frac{2}{11}$ min. after 7, ANS.

(7) $\frac{6}{7}=\frac{6}{29}$; $\frac{7}{7}=\frac{7}{29}$; $\frac{29}{29}+\frac{7}{29}=\frac{36}{29}$
$12\div\frac{36}{29}=9\frac{2}{3}$; $12-9\frac{2}{3}=2\frac{1}{3}$ o'clock P. M., ANS.

(8) $\frac{3}{5}=\frac{9}{27}$; $\frac{5}{5}=\frac{5}{5}$; $\frac{9}{9}+\frac{5}{9}=\frac{14}{9}$; $12\div\frac{14}{9}=7\frac{5}{7}$.
$12-7\frac{5}{7}=4\frac{2}{7}$ or $17\frac{1}{7}$ min. after 4 P. M., ANS.

(9) $\frac{2}{5}=\frac{34}{155}$; $\frac{5}{5}=\frac{17}{31}$; $\frac{31}{31}+\frac{17}{31}=\frac{48}{31}$.
$36\div\frac{48}{31}=22\frac{3}{4}$; $36-22\frac{3}{4}=13\frac{1}{4}$ or $1\frac{1}{4}$ o'clock A. M., ANS.

(10) $\frac{1}{2}=\frac{1}{4}$; $\frac{2}{2}=\frac{1}{2}$; $\frac{2}{2}+\frac{1}{2}=\frac{3}{2}$; $12\div\frac{3}{2}=8$ P. M., ANS.

(11) $\frac{5}{11}$ of $12=\frac{60}{11}$ hr.—90 min.$=3\frac{2}{22}$ hrs.
$3\frac{21}{22}$ hrs.$=57\frac{3}{11}$ min. past 3 P. M., ANS.

(12) $\frac{12}{12}-\frac{1}{12}=\frac{11}{12}$; $22\div\frac{11}{12}=24$ min., ANS.

(13) 46 min. to gain.
$46\times\frac{12}{11}=50\frac{2}{11}$ min.
$60-50\frac{2}{11}=9\frac{9}{11}$ min. before 10, ANS.

(14) $\frac{12}{12}-\frac{1}{12}=\frac{11}{12}$. From 12 to 4=20 min.
$20\div\frac{11}{12}=21\frac{9}{11}$ min. past 10, ANS.

(15) Minute hand must gain 10 and 30 min.
$10\times\frac{12}{11}=10\frac{10}{11}$ min. past 4.
$30\times\frac{12}{11}=32\frac{8}{11}$ min. past 4, ANS.

(16) The hour-hand is 40 minutes + a certain distance (or 1 space) from 12. The minute-hand is $\frac{1}{2}$ as far or 20 min. $+\frac{1}{2}$ space. The minute-hand moves 12 spaces to 1 of the hour-hand. 20 min.$+\frac{1}{2}$ space equals 12 spaces, or 20 minutes$=11\frac{1}{2}$ spaces. $20\div11\frac{1}{2}=1\frac{17}{23}$ or 1 space. 12 spaces$=1\frac{17}{23}\times12=20\frac{20}{23}$ min., ANS.

(*b*) The hour-hand is 10 min.+1 space from 6. The minute-hand is (10 min.+1 space)$\times2$=20 minutes+2 spaces or 50 minutes+2 spaces from 12. 50 min.+2 spaces=12 spaces; 50 min.=10 spaces; 1 space=5 min. $5\times12=$ 60 min. past 8 or 9 o'clock, ANS.

(17) 12—2=10. $30\div10=3$ min.
Min. hand travels 12 times as fast as hour-hand. $3\times12=$ 36 min., ANS.

(18) $\frac{17}{17}+\frac{7}{17}=\frac{24}{17}$; $4\div\frac{24}{17}=2\frac{5}{6}$; $4-2\frac{5}{6}=1\frac{1}{6}$ p. m., ANS.

APPLICATION OF SQUARE ROOT.

(1) 1A=160 rds. $\sqrt{160}=12.64+$rds., ANS.

(2) $\sqrt{10\times160}=40$ rds., ANS.

(3) $\sqrt{10\text{A}\times160}=40$ rds. to the side.
$40\times16\frac{1}{2}=660$ ft.; $660\div15=44$.
$44\times4\times\$40=\$70.40$.
$\frac{44\times4\times5}{100}\times\$6=\$52.80$.
$\$70.40+\$52.80=\$123.20$, ANS.

(4) $\sqrt{216 \div 6} = 6$ in., ANS.

(5) Each round will be the hypotenuse of a right-angled triangle whose sides are 8 ft. and 6 ft. $\sqrt{8^2+6^2}=10$.
$50 \div 6 = 8\frac{1}{3}$ rounds; $10 \times 8\frac{1}{3} = 83\frac{1}{3}$ ft., ANS.

(6) $15 \times 6 = 90$; $18 \times 6 = 108$.
$\sqrt{(90)^2+(108)^2} = 140.58+$ mi., ANS.

(7) $20 \times 160 = 3200$.
$\sqrt{3200 \div 2} = 40$. $40 \times 2 = 80$.
$(40 \times 2)+(80 \times 2) = 240$ rds., ANS.

(8) $5408 \div 2 = 2704$. $\sqrt{2704} = 52$ ft. width.
$52 \times 2 = 104$ ft. length, ANS.

(9) $\sqrt{(100)^2+(60)^2+(26)^2} = 119.43+$ ft., ANS.

(10) $\sqrt{\frac{1}{2} \text{ of } (50)^2} = 35.35+$, ANS.

APPLICATION OF CUBE ROOT.

(1) $\sqrt[3]{2150.4} = 12.9+$ in., ANS.

(2) $1728 \times 15\frac{5}{8} = 27000$ cu. in.
$\sqrt[3]{27000} = 30$ in.
$30 \times 30 \times 6 = 5400$ sq. in., ANS

(3) $(16)^3 - 6 = 210$ cu. in., ANS.

(4) $\sqrt[3]{231 \times 1500} = 70.23+$ cu. in., ANS.

(5) $\sqrt[3]{80 \times 128} = 21.71+$ ft., ANS.

(6) $192\times27=5184$.
$1\times4\times6=24$. $5184\div24=216$.
$\sqrt[3]{216}=6$ ft. depth; $6\times4=24$ width; $6\times6=36$ length, ANS.

(7) $13\frac{1}{2}=\frac{27}{2}$; $\frac{27}{2}\div32=\frac{27}{64}$.
$\sqrt[3]{\frac{27}{64}}=\frac{3}{4}$; $\frac{3}{4}\times1=\frac{3}{4}$ ft.$=9$ in. square.
$\frac{3}{4}\times32=24$ ft. length, ANS.

(8) $\sqrt[3]{2048\div4}=8$ ft., ANS.

(9) $\sqrt[3]{729\times8}=18$ ft., ANS.

(10) $2150.4\times100=215040$.
$215040\div3=71680$.
$\sqrt[3]{71680}=41.53+$in.$=3.46+$ft. height and width.
$3.46+\times3=10.38+$ft. length, ANS.

MEASUREMENTS.

(1) $(6)^2\times3.1416\times10=1130.976$ cu. ft.
$(1130.976\div550)\times\$15=\$30.84+$. ANS.

(2) $20\times20\times15=6000$; $6000\div450=13\frac{1}{3}$ T., ANS.

(3) $30\times20\times20\div550=21\frac{9}{11}$ T, ANS.

(4) $10\times5\times8\times12=4800$ cu. ft.
$4800\times.8=3840$ bu., ANS.

(5) $1728\times6.25=10799.8$ cu. in.
$10799.8\div231=46.75+$gal., ANS.

(6) $750\div1\frac{1}{4}=600$ bu., ANS.

(7) $135\times.8=108$ cu. ft.
$1\times6\times9=54$. $108\div54=2$ ft. depth.
$2\times9=18$ ft. length. $18\div6=3$ ft. width, ANS.

(8) $\sqrt[3]{583.2\div.8}=9$ ft., ANS.

(9) $10\times4\times8\times.8=256$ bu.
1 bu. $\div 1\frac{1}{3}$ pk. $=3$;
$256\times3=768$ bags, ANS.

(10) $(80\times2\frac{1}{2}\times10)\div24\frac{3}{4}=80\frac{80}{99}$ P.
$80\frac{80}{99}\times\$1=\$80\frac{80}{99}$, ANS.

(11) $(45\times2)+(60\times2)=210$.
$\$254.54\frac{6}{11}\div(210\times8\times1\frac{1}{2}\div24\frac{3}{4})=\$2.50$, ANS.

(12) $(60\div3.1416)^2\times.7854\times20\times2\frac{1}{2}$ cts. $=99.5+$ cts., ANS.

(13) 8 in. $=\frac{2}{3}$ ft. $20\times\frac{2}{3}\times4=53\frac{1}{3}$ ft., ANS.

(14) $16\times1\frac{1}{4}\times12=240$ ft., ANS.

(15) $(30)^2=900$. $\sqrt{900\div3}=17.32+$ in., ANS.
Or side : diameter of cube :: $1:\sqrt{3}$.
$\therefore\ 30\div\sqrt{3}=17.32+$ in., ANS.

(16) $[(40-2)^3\times.5236]\div231=124.37+$ gal., ANS.

(17) $(60)^2\times3.1416\times.02=\$226.195+$, ANS.

(18) 3.1416×5 cts. $=\$.15708$.
$\$1005.312\div\$.15708=6400$.
$\sqrt{6400}=80$ in., ANS.

(19) $\$226.195\div[(60)^2\times3.1416]=2$ cts., ANS.

(20) $(2)^2\times6\times.50=\$12$, ANS.

(21) $\sqrt{(4)^2\times(6)^2}=24$; $24+36+16=76$.
$\frac{76}{144}\times4\times20=42\frac{2}{9}$ cu. ft., ANS.

(22) $(3)^2\times.7854=7.0686$.
$(2)^2\times.7854=3.1416$.
$\sqrt{7.0686\times3.1416}=4.7124$.
$(4.7124+3.1416+7.0686)\times\frac{1}{3}$ of $40=198,968+$, ANS.

(23) $(16)^2 \times .7854 = 201.06+$.
$(12)^2 \times .7854 = 113.09+$.
$\sqrt{201.06 \times 113.09} = 150.78$.
$(201.06+113.09+150.78) \times \frac{1}{3}$ of $15 = 2324.65+$ cu. ft. ANS.

24) $(8)^2 = 64$; $(20)^2 = 400$; $\sqrt{64 \times 400} = 160$ mean base.
$64+400+160 = 624$; $\frac{6}{14}\frac{2}{4} \times \frac{1}{3}$ of $20 = 28\frac{8}{9}$ cu. ft., ANS.

(25) $\frac{1}{2}$ of $(20+30) = 25$; $25 \div 12 = 2\frac{1}{12}$ ft.
$10 \times 2\frac{1}{12} \times 4 = 83\frac{1}{3}$ sq. ft., ANS.

(26) $20 \div 12 = 1\frac{2}{3}$ ft.; $(1\frac{2}{3})^2 \times 20 \times \$2.25 = \$125$, ANS.

(27) $(764)^2 \times \frac{1}{3}$ of $480 = 93391360$ cu. ft., ANS.

(28) $8 \div 2 = 4$; $4 \times 5 \times 5 = 100$; $5 \times 5 = 25$.
$100+25 = 125$ sq. ft., ANS.

(29) $\frac{1}{2}$ of $8 \times 80 = 320$; $320 \times 8 = 2560$ sq. ft.
$\$140.80 \div 2560 = 5\frac{1}{2}$ cts., ANS.

(30) $\frac{60 \times 40}{2} \times .05 = \$60$, ANS.

(31) $(30)^2 \times .7854 \times 20 \times 1728 \div 231 = 105753\frac{3}{5}$ gal., ANS.

(32) $(2)^2 \times .7854 \times 50 \times .20 = \$31.41+$, ANS.

(33) $(2\frac{1}{2})^2 \times .7854 = 4.90875$.
$\$3.927 \div (4.90875 \times 1 \times .10) = 8$ ft., ANS.

(34) $\$27 \div (60 \times .20) = 2.25$.
$\sqrt{2.25} = 1.5$ ft. $= 18$ in. square.
$\frac{1}{9}$ of $18 = 2$; $18-2 = 16$ plank.
$16 \times 60 \times 1\frac{1}{2}$ ft. wide $= 1440$ sq. ft., ANS.

(35) $6 \times 2\frac{1}{2} \times 4 = 60$.
$(2\frac{1}{2})^2 = 6\frac{1}{4}$; $\$3.31\frac{1}{4} \div (60+6\frac{1}{4}) = 5$ cts., ANS.

(36) $3 \times 12 = 36$; $\sqrt{(36)^2 \div 2} = 25.45+$ in., ANS.

(37) $(14)^2 = 196$; $(\sqrt{196-2})^2 = 98$; $98 \times \$2 = 196$, ANS.

(38) $5280 \div 3.1416 = 1680.67+$ ft., ANS.

(39) $5280 \div 3.1416 = 1680.67+$ ft.
$(1680.67)^2 \times .7854 = 50$ A. 148 P. 188.39+ sq. ft., ANS.

(40) $(100)^2 \times .7854 \times .10 = \$785.40$, ANS.

(41) $7854 \div .7854 = 10000$; $\sqrt{10000} = 100$.
$100 \div 2 = 50$ ft., ANS.

(42) $\sqrt{(800)^2 - (620)^2} = 505.57+$ ft., ANS.

(43) $\sqrt{(40)^2 - (10)^2} = 38.72+$ ft., ANS.

(44) $5^2 \times .7854 \times 2 = 39.27$ sq. ft.
$5 \times 3.1416 \times 30 = 471.24$.
$(471.24 + 39.27 - 10) \times \$.02 = \$10.01+$, ANS.

(45) $20 \times 63 \times 231 = 291060$ cu. in.
$291060 \div [(70)^2 \times .7854] = 75.63+$ in.
$75.63 \div 12 = 6$ ft. $3.63+$ in., ANS.

(46) Capacities are as $1^2 : (1\frac{1}{2})^2$
$= \frac{1^2}{(1\frac{1}{2})^2} = \frac{4}{9}$; $15 \times \frac{4}{9} = 6\frac{2}{3}$.
$6\frac{2}{3} \times 8 = 53\frac{1}{3}$, ANS.

(47) $(15)^2 \times 3.1416 = 706.86$, ANS.

(48) $\sqrt{196 \div .7854} = 15.79+$ in., ANS.

(49) $(11)^2 \times 3.1416 = 380.133+$ sq. ft., ANS.

(50) $24 \times 32 \times 2 = 1536$; $1536 \div 100 = 15.36$.
$\$76.80 \div 15.36 = \$5$, ANS.

(51) $9 \times 13 \times \frac{3}{4} \times 1\frac{1}{2} = 131+$ ft.; $131 \div 100 = 1.31+$.
$1.31+ \times \$1 = \$1.31+$, ANS.

(52) $\sqrt{1520.5344 \div 3.1416} = 22$ ft., ANS.

(53) $39.27 \div 3.1416 = 12.5$.
$39.27 \times 12.5 = 490.875$ sq. in., ANS.

(54) $\sqrt[3]{65.45 \div .5236} = 5$.
$(5)^2 \times 3.1416 = 78.54$ sq. in., ANS.

(55) $(1\frac{1}{4})^3 \times .5236 = 1$ cu. ft. 391.5 cu. in., ANS.

(56) $\sqrt{(52)^2 - (20)^2} = 48$ ft.
$(48)^2 \times 3.1416 = 7238.2464$ sq. ft. $= 26.58+$ P., ANS.

(57) $3.1416 \times 4 \times 2\frac{1}{2} = 31.416$—, ANS.

(58) $10 + 10\frac{1}{2} + 14\frac{1}{2} = 35$; $35 \div 2 = 17.5$.
$17.5 - 10 = 7.5$; $17.5 - 10.5 = 7$; $17.5 - 14.5 = 3$.
$\sqrt{17.5 \times 7.5 \times 7 \times 3} = 52.5$, ANS.

(59) $\sqrt{\frac{136 \times 17}{2}} = 34$, ANS.

(60) $16 \times 8 \times 2 = 256$
$14 \times 8 \times 2 = 224$

$2)480 (240$; $240 \div 3 = 80$ yds., **ANS.**

(61) $(6)^2 \times .7854 \times 5\frac{1}{4} \times 1728 = 256505.35+$.
$256505.35+ \div (31\frac{1}{2} \times 231) = 35.25+$, ANS.

MISCELLANEOUS.

(1) $(100)^2 - (30)^2 = 9100$; $9100 \div (100 \times 2) = 45\frac{1}{2}$, ANS.

(2) 10=G. C. D.; $40 \times 30 = 1200$ rds.
$1200 \div (10)^2 = 12$, ANS.

(3) $27 : 343 :: (3) : \sqrt[3]{343} = 7$, ANS.

(4) Let 1=diameter of cheese.
$(1)^2 \times .7854 = .7854$ area of whole cheese.
The square of the sq. rt. of $\frac{1}{2}$ of 1=.5, area of largest inscribed square.
$.7854 - .5 = .2854+$ area of segments.
$3 \times 4 = 12$ lbs., four segments; $.2854 : .7854 :: 12 : 33.02+$ lbs., ANS.

(5) $(3)^2 : (1\frac{1}{2})^2 :: 5 : 1\frac{1}{4}$ hr., ANS.

(6) $\sqrt{(60)^2-(30)^2}=51.96+$ alt. of triangle.
$\frac{2}{3}$ of $51.96+=34.64+$ distance from corner of triangle to the center.
$\sqrt{(51.96+)^2-(34.64+)^2}=38.73+$ ft., ANS.

(7) $30\times160\times2=9600$; $9600+(100)^2=19600$.
$\sqrt{19600}=140$ sum of sides; $(100)^2-(4800\times2)=400$.
$\sqrt{400}=20$ diff. of sides; $140-20=120$; $120\div2=60$ width; $60+20=80$ length, ANS.

(8) $1 : \frac{1}{2} :: (9)^2 : 40.5$; $\sqrt{40.5}=6.36+$ in., ANS.

(9) $36=$G. C. D.; $1332\div36=37$; $37-1=36$, ANS.

(10) $(5)^3=125$; $(125)^2=15625$, ANS.

(11) $10^2=100$; $\sqrt{100\times2}=14.14+$; $14.14+10=24.14$, ANS.

(12) $32-4=28$; $(28)^2\times\frac{20}{16}=980$ ft., ANS.

(13) $18\times160=2880$; $\frac{1}{3}$ of $2880=960$; $\sqrt{960}=30.9+$ rds., ANS.

(14) $\sqrt{(36)^2\div3}=20.7+$ in., ANS.

(15) $\sqrt{(12)^2\div3}=6.9+$; $[(6.9)^3\times1728]\div2150.4=266+$ bu., ANS.

(16) $\sqrt{8\times160\times2}=35.7+$ rds., ANS.

(17) $\sqrt{\frac{1}{2}}$ of $136\times17=34$, ANS.

(18) $(16)^2+(4)^2=272$; $272\div(4\times2)=34$ ft., ANS.

(19) $49\frac{5}{8}\times144=7146$; $(1\frac{1}{2})^2\times2=\frac{9}{2}$; $7146-\frac{9}{2}=7141\frac{1}{2}$.
$\sqrt{7141\frac{1}{2}\div6}+1\frac{1}{2}=36$ in., ANS.

(20) 1 fur.=40 rds.; $\sqrt{(40)^2-(20)^2}=34.6+$ alt. of Δ.
$34.6+\times20=692+$ sq. rds.; $692+\div160=4.32+$ A., ANS.

(21) $[(30)^2\times.7854]-[(20)^2\times.7854]=392.7+$ sq. ft., ANS.

(22) A=length; A−12=width.
$(A-12)\times A=4\times160$ sq. rds.
$\sqrt{A^2-12A+36}=\sqrt{640+36}$.
$\therefore A-6=26$; $A=32$; $32-12=20$, ANS.

(23) 20 rails per rd. 4 sides=80.

$$(80)^2=\text{No. A's}-\frac{(\text{rds.})^2}{160}.$$

$(80)^2\times 160=1024000$, ANS.

(24) $(3\frac{1}{2})^2\times 3.1416=38.4+$, ANS.

(25) $50\times .75=\$37.50$; $\$37.50-\$27.50=\$10$.
$.75+.25=\$1$; $\$10\div\$1=10$ da., ANS.

(26) $3+5+7=15$; $120\div 15=8$.
$8\times 3=24$;
$8\times 5=40$;
$8\times 7=56$, ANS.

(27) $(30)^2\times .7854=706.86+$; $\frac{2}{3}$ of $706.86+=471.24+$.
$\sqrt{471.24\div .7854}=24.49+$; $30-24.49=5.51+$.
$\frac{1}{2}$ of $5.51=2.75+$ 1st.
$\frac{1}{2}$ of $471.24=235.62$; $\sqrt{235.62\div .7854}=17.31+$.
$\frac{1}{2}$ of $(24.49-17.31)=3.59+$ 2d.
$\frac{1}{2}$ of $17.31=8.65+$ 3d, ANS.

(28) 2=G. C. D. of 2, 4 and 6; $20\div 2=10$ hrs., ANS.

(29) $\frac{1}{3}-\frac{1}{4}=\frac{1}{12}$; $\frac{1}{12}=\$20$; $\frac{12}{12}=\$240$, ANS.

(30) $10\times 2=20$; $20+10=30$ in.; $30+10=40$ in. tail and head.
$40\times 2=80$ in., ANS.

(31) $\frac{1}{18}-\frac{1}{30}=\frac{1}{45}$; $\frac{45}{45}\div\frac{1}{45}=45$ days, ANS.

(32) $(4000+3)^2 : (4000)^2 :: 20 : 19.97+$, ANS.

(33) $\sqrt{484\div 16}=5\frac{1}{2}$ sec., ANS.

(34) $\frac{1}{2}$ of $12=6$; $(6)^2\times 16=576$ ft., ANS.

(35) $(2)^2\times 16=64$ ft., ANS.

(36) $(20)^2 : (30)^2 :: 50 : 112\frac{1}{2}$ bu., ANS.

(37) $500\times 160\div .7854=319.1+$ diameter.
Let 1=radius of small circle.
$\sqrt{(2)^2-(1)^2}=1.732+$; $\frac{2}{3}$ of $1.732+=1.1546+$.
$1.1546+1=2.1546$; $319.1+\div 2.1546=148.1+$ rds., ANS.

(38) $\sqrt[3]{125}=5$; $\sqrt[3]{216}=6$; $(5)^2 : (6)^2 :: \$10 : \$14.40$, ANS.

(39) 87.96 : 365.25 :: 45 yrs. : 186.8 yrs. Mercury;
30636.82 : 365.25 :: 45 yrs. : .53+ or a little over $\frac{1}{2}$ yr. old, Jupiter. ANS.

(40) A hits $\frac{7}{12}$ and B $\frac{3}{4}$ of the time; $\frac{7}{12}+\frac{3}{4}=\frac{16}{12}$.
$32\div\frac{16}{12}=24$, ANS.

(41) $1\frac{7}{8}\times 160=300$; $300\times 2=600$; $600\div 20=30$.
$\sqrt{(30)^2+(20)^2}=36+$ rds., ANS.

(42) $(\frac{3}{4})^2-(\frac{1}{3})^2=\frac{65}{144}$; $(\frac{3}{4})^2=\frac{81}{144}$; $\frac{65}{144} : \frac{81}{144} :: 50 : 62\frac{4}{13}$ min., ANS.

(43) Let 1=radius; $\sqrt{(2)^2-(1)^2}=1.732+$ alt. of triangle.
$1.732\times 1=1.732$ area of triangle.
$(2)^2\times .7854=3.1416$ area of circle.
$\frac{1}{2}$ of 3.1416 = 1.5708+ area of sectors.
1.732—1.5708=.161+ inclosed space.
.161 : 160 rds. :: $(1)^2$: 993.788+.
$\sqrt{993.788+}=31.5+$ radius; $31.5\times 2=63+$ rds., ANS.

(44) $\sqrt{(12)^2\times 4}=24$, ANS.

(45) $5\times 4=20$; $20\div 2=10$ sq. ft., ANS.

(46) $\$2500\times(100-5)=\$2375$.
$\$2500\times 6\%\times 2=\$300$; $\$2500+\$300=\$2800$.
$\$2800-\$2375=\$425$ int. for 2 yrs.; $\$425\div 2=\$212.50$ for 1 yr.
$\$212.50\div\$2375=8\frac{8}{19}\%$, ANS.

(47) $16\frac{1}{2}\div(2\times 7\times 2\times 9)=\frac{11}{168}$; $\frac{11}{168}\times 4=\frac{44}{168}$; $\frac{11}{168}\times 5=\frac{55}{168}$;
$\frac{55}{168}\times\frac{44}{168}=\frac{605}{7056}$; $43560\div\frac{605}{7056}=508032$, ANS.

(48) $\frac{S^2-P^2}{2S}$=base or $\frac{(108)^2-(36)^2}{2\times 108}$=48 base;
108—48=60 ft. hypotenuse, ANS.

(49) $\frac{16}{16}+\frac{9}{16}=\frac{25}{16}$; $10000\div\frac{25}{16}=6400$.
$\sqrt{10000}-\sqrt{6400}=20$; $20\div 2=10$ yds., ANS.

(50) $\sqrt{(10)^2+(10)^2}=14.14+$ ft., ANS.

(51) $(4)^3=64$ cu. in.; $64+61=125$; $\sqrt[3]{125}=5$; $5-4=1$;
$1\div 2=\frac{1}{2}$ in., ANS.

(52) 5280 ft. $\div 840\frac{1}{3}=6.2832$ ft. cir. of wheel.
$6.2832\div 3.1416=2$ ft., ANS.

(53) $5 : (195+5) :: 5 : 200$ radius hid.
$(200\times 2)^2\times .7854=502656$ sq. ft., ANS.

(54) $(12+2)\times 3.1416=43.98+$, ANS.

(55) 3957.5 miles radius of the earth at that point;
3.65+ miles height of Mt. St. Elias;
$\sqrt{3957.5\times 3.65\times 2}=169.9+$ miles, ANS.

(56) $\frac{1}{2}$ A$=80$ sq. rds.
$80\div 5\times 1=16$; $\sqrt{16}=4$ width; $4\times 5=20$ length, ANS.

(57) $(168\div 12)-(98\div 7\frac{1}{2})=\frac{14}{15}$; $\frac{14}{15}\times 7\frac{1}{2}=\$7$.
$\$7\div 5=\$1.40$, ANS.

(58) $80\left|\begin{matrix}65\\90\end{matrix}\right|\begin{matrix}15\\10\end{matrix}\left|\begin{matrix}1\\1\frac{1}{2}\end{matrix}\right.$ $1=24$; $1\frac{1}{2}=36$ oz., ANS.

(59) 24 min.$=6°$; $16°\ 18'-6°=10°\ 18'$ W., ANS.

(60) $880\div 4=220$; $432\div 4=108$.
$220-108=112$; $(12)^2=144$.
$\sqrt{144+112}=16$; $16-12=4$ in., ANS.

(61) $\sqrt{(40)^2+(8)^2}=40.7+$ length of the ladder.
$\sqrt{(40.7+)^2-(40-10)^2}=27.64+$ ft., ANS.

(62) $\sqrt{(20)^2\times 2}=28+$ ft.; $28+\div 2=14+$.
$\sqrt{(20)^2+(14+)^2}=24.49+$ ft., ANS.

(63) $40\times 1\frac{1}{2}=60$ in.$=5$ ft.; $5\div 4=\frac{5}{4}$; $(\frac{5}{4})^2=\frac{25}{16}$.
$43560\div\frac{25}{16}=27878\frac{2}{5}$ A, ANS.

(64) $(16\div 2)^2=64$; $64\times 16=1024$ ft., ANS.

(65) $16\times 16=256$; $\frac{5}{16}$ of $256=60$; $\sqrt{256-60}=14$.
$16-14=2$; $2\div 2=1$ rd., ANS.

(66) $5760 : 7000 :: 160 : 194+$, ANS.

(67) $\sqrt{10\times160}=40$; $40\times16\frac{1}{2}=660$ ft.
$660\times\frac{1}{2}\times5\times4=6600$ sq. ft.
$(6600\div1000)\times\$8=\$52.80$, ANS.

(68) $96\div8=12$; $(12\div2)\times12\times8=576$ sq. ft., ANS.

(69) 6, 8 and 10 are in proportion as 1, $1\frac{1}{3}$ and $1\frac{2}{3}$.
$12\times1\frac{1}{3}=16$; $12\times1\frac{2}{3}=20$; 12, 16 and 20=sides.
$(12+16+20)\div2=24$.
$\sqrt{24\times12\times8\times4}=96$ rds.
$(96\div160)\times\$850=\$510$, ANS.

(70) $\frac{1}{15}+\frac{1}{10}=\frac{1}{6}$ hr. to go 1 mi. and return.
$4\div\frac{1}{6}=24$ miles, ANS.

(71) $(6)^2\div(4)^2=2\frac{1}{4}$ times, ANS.

(72) $4+2=6$; $6\div3=2$ each. A furnishes the pies for C and gets the 10 cts., ANS.

(73) $(1)^2\times.7854\times\frac{1}{3}$ of $2=.5236$ solidity of cone.
$\sqrt[3]{.5236\div.5236}=1$ ft., ANS.

(74) $9\frac{1}{2}\times3\frac{1}{2}\times1\frac{1}{12}\times1728=62244$ cu. in.
$62244\div2150.42=24+$bu., ANS.

(75) $\$72.50-\$50=\$22.50$.
$8\frac{1}{2}\%$ of $\$50$ for 1 yr.$=\$4.25$.
$\frac{22.50}{4.25}=5$ yrs. 3 mo. 16 da., ANS.

(76) $\frac{12}{12}+\frac{5}{12}=\frac{17}{12}$; $\frac{17}{12}$ of $12=17$; $17-12=5$.
$5-1\frac{1}{2}=3\frac{1}{2}$ P. M., ANS.

(77) $(5)^2:(10)^2::500:2000$.
$2000\times(20\div10)=4000$, ANS.

(78) $(6)^2=36$; $(18)^2=324$; $\sqrt{36\times324}=108$.
$(36+108+324)\times\frac{1}{3}$ of $20=3120$ cu. ft.
$3120\div12=260$ ft., ANS.

(79) $(5)^2 \times .7854 = 19.635$.
$(10)^2 \times .7854 = 78.54$.
$\sqrt{19.635 \times 78.54} = 39.27$.
$(19.635 + 39.27 + 78.54) \times (\frac{1}{3}$ of $20 \times 12) \div 144 = 7.7+$ ft., ANS.

(80) $(5)^3 : (6)^3 :: 120 : 207+$ lbs., ANS.

(81) $9 - 8\frac{1}{2} = \frac{1}{2}$; $9 \div \frac{1}{2} = 18$, ANS.

(82) $\sqrt{5400 \div 6} = 30$ side of cube.
$(30)^3 = 27000$ cu. in., ANS.

(83) $15 \div 12 = 1\frac{1}{4}$; $15 - 10 = 5$; $5 \div 1\frac{1}{4} = 4$, ANS.

(84) $(\frac{1}{80} \times 40) + (\frac{1}{40} \times 12) = \frac{64}{80}$; $\frac{80}{80} - \frac{64}{80} = \frac{16}{80}$.
$\frac{16}{80} \div \frac{1}{40} = 8$ da.; $40 - 8 = 32$d day, ANS.

(85) $60 \div 12 = 5$; $30 \times 5 = 150$ in.; $150 \div 3.1416 = 47.7+$.
$47.7 \div 2 = 23.8+$ in., ANS.

(86) $80 \times \$3 = \$240$; $\$240 - \$150 = \$90$.
$\$90 \div (3+1) = 22\frac{1}{2}$ da.; $80 - 22\frac{1}{2} = 57\frac{1}{2}$ da., ANS.

(87) $(5)^2 : (12\frac{1}{2})^2 :: 100 : 625$, ANS.

(88) $(10)^2 \times \frac{1}{3}$ of $20 = 666\frac{2}{3}$; $666\frac{2}{3} \div 2 = 333\frac{1}{3}$.
$\sqrt[3]{(20)^3 : 666\frac{2}{3} :: (x)^3 : 333\frac{1}{3}} = 15.8+$.
$20 - 15.8+ = 4.2-$, ANS.

(89) $(20)^3 : (10)^3 :: 10 : 1\frac{1}{4}$, ANS.

(90) $60 \div 15 = 4$; $2 \times 4 = 8$; $\frac{1}{12} = 8$; $\frac{12}{12} = 96$ in.
$96 \div 3.1416 = 30+$; $30+ \div 2 = 15+$ in., ANS.

(91) $6 \div 2 = 3$; $3 - \frac{1}{2} = 2\frac{1}{2}$; $6 - 2\frac{1}{2} = 3\frac{1}{2}$.
$3\frac{1}{2} + 2\frac{1}{2} = 6$; $\frac{3\frac{1}{2}}{6}$ of $200 = 116\frac{2}{3}$.
$\frac{2\frac{1}{2}}{6}$ of $200 = 83\frac{1}{3}$, ANS.

(92) 3 ft.=36 in.; $(36)^2 \times .7854 = 1016.8784$ sq. in.
A $\frac{2}{5}$, B $\frac{7}{20}$ and C $\frac{1}{4}$; $\frac{2}{5}$ of 1016.8784=406.75 sq. in. A's;
$\frac{7}{20}$ of 1016.8784=355.907 sq. in. B's;
$\frac{1}{4}$ of 1016.8784=254.219 sq. in. C's, ANS.

☞ To find what part of diameter each grinds off, see rule to find diameter of circle.

(93) $50 \times .25 = \$12.50$; $\$12.50 \div .40 = 31\frac{1}{4}$ gal.
$50 - 31\frac{1}{4} = 18\frac{3}{4}$ gal., ANS.

(94) $\frac{1}{4} \times \frac{1}{4} = \frac{1}{16}$; $1728 \div (\frac{1}{16} \times 12) = 2304$ ft., ANS.

(95) $200 \times 160 = 32000$ rds.
$40 \div 2 = 20$; $(20)^2 = 400$; $\sqrt{32000 + 400} = 180$.
$180 - 20 = 160$ rds. shorter sides;
$160 + 40 = 200$ rds. longer side, ANS.

(96) $20 \times 160 = 3200$; $\sqrt{3200} = 56.5+$.
$56.5 \times 4 \times \$3 = \$678$, ANS.

(97) $\sqrt{(32)^2 + (12)^2} = 34.1+$ ft. slant height.
$24 \times 3.1416 = 75.3984$ cir.
$$\left(\frac{75.3984 \times 34.1}{2} \right) \div 9 = 142.8+ \text{sq. yds., ANS.}$$

(98) $7\frac{1}{2} \times 160 = 1200$; $(50)^2 = 2500$; $1200 \times 2 = 2400$.
$\sqrt{2500 + 2400} = 70$ sum of sides.
$\sqrt{(50)^2 - 2400} = 10$ diff. of sides.
$(70 - 10) \div 2 = 30$ shorter side; $30 + 10 = 40$ longer, ANS.

(99) $(10)^3 \times .5236 = 523.6$ cu. in. solidity.
$523.6 \div 3 = 174.3+$; $523.6 - 174.53 = 349.07$.
$\sqrt[3]{349.07 \div .5236} = 8.7$; $10 - 8.7 = 1.3+$ 1st.
$349.07 - 174.53+ = 174.54$.
$\sqrt[3]{174.54 \div .5236} = 5.5+$ in. 3d.
$8.7 - 5.5 = 3.2+$ in. 2d, ANS.

(100) 40 for \$40=\$1.00 each.
28 " \$35= 1.25 "
12 .25
40—35=5=$\frac{5}{12}$ of extra scholar.
$\frac{5}{12}$ of .25=.10$\frac{5}{12}$.
\$1.00+.10$\frac{5}{12}$=\$1.10$\frac{5}{12}$.
35×\$1.10$\frac{5}{12}$=\$38.64$\frac{7}{12}$, ANS.

(101) $(13)^2 \times .7854 = 132.735+$.
$(8\frac{1}{2})^2 \times .7854 = 56.74+$.
$\sqrt{132.735} \times 56.74 = 86.78+$.
132.73+56.74+86.78+=276.25+.
276.25+×($\frac{1}{3}$ of 8$\frac{1}{2}$)÷231=3 gal. 1 qt. 1— pt., ANS.

(102) \$60×2=\$120; \$120+\$60=\$180.
$\frac{5}{4}+\frac{4}{4}=\frac{9}{4}$; $\frac{9}{4}$=\$180; $\frac{4}{4}$=\$80 2d horse.
\$120—\$80=\$40 cow, ANS.

(103) 10×3=30; 30—10=20; 2×2=4; 4—2=2.
20+2=22 yrs. son's age.
$\frac{1}{2}$=22; $\frac{2}{2}$=44; 44+2=46 father's age, ANS.

(104) \$540—\$300=\$240; \$300—\$240=\$60.
$\frac{4}{4}-\frac{3}{4}$+40=60; $\frac{1}{4}$=20; $\frac{4}{4}$=80 days 2d.
$\frac{3}{4}$ of 80=60; 60+40=100 days 1st, ANS.

(105) By the reading of the problem we can see that the head and tail together weigh 4 lbs.
4×2=8 lbs. body; 8+4=12 lbs., ANS.

(106) $\frac{1}{3}$=16 times+6; $\frac{3}{3}$=48 times+18.
(134+80)—18=196; 196÷(48+1)=4 ft.
134—4=130 ft., ANS.

(107) 5×2=10; $(10)^2 \times .7854 = 78.54$
78.54×($\frac{1}{3}$ of 6)×1728÷4=67858.56 cu. in.
67858.56÷2150.4=31.55+ bu.
31.55+×\$1=\$31.55+, ANS.

(108) Am't of \$1 at 6% for 6 yrs.=\$1.36
" " " 10% " 3 " =\$1.30
.06

\$300÷.06=\$5000, ANS.

(109) 1859 5 12 — 1857 8 18 — 1 8 24

Int. on \$1 for 1 yr. 8 mo. 24 da. is .10⅔;
\$26÷.10⅔=\$250, ANS.

(110) 507÷3=169; $\sqrt{169}$=13, ANS.

(111)

°	′	″	hr.	min.
31	27	30	14	2
	2	30	2	6
15)31	30		11	56 ANS.
2 hr.6 min.				

(112) \$1+.20=\$1.20; 120 cts.×4=480, ANS.

(113) 6% of \$660 for 1 yr.=\$39.60.
\$213.40÷\$39.60=$5\frac{7}{18}$ yr.=5 yr. 4 mo. 20 da., ANS.

(114) The minute-hand moves 60 min. while the hour-hand moves 5 minutes and gains 55 minutes.
60÷55=$1\frac{1}{11}$ min. to gain 1 min.
25—14=11 min. to be gained.
$1\frac{1}{11}\times 11$=12 min. past 5, ANS.

(115) $(8)^3$=512; $\sqrt{512\times .22\frac{2}{3}}$=10⅔, ANS.

(116) Int. on \$1 for 23 da.=.003625.
\$7.25÷.003625=\$2000, ANS.

(117) Wife receives 3 times as much as daughter, son 3 times as much as wife.
$\frac{3}{4}\times 3=\frac{9}{4}$ son; ¾=wife; ¼=daughter.
$\frac{9}{4}+\frac{3}{4}+\frac{1}{4}=1\frac{3}{4}$; $\frac{1}{4}$=\$6591; ¼=\$507 daughter.
¾=\$1521 wife; 9/4=\$4563 son, ANS.

(118) 48—27=21; 48+21=69; 90—69=21.
90+(21×3)=153; 174—153=21, ANS.

(119) 9+15=24; $\frac{15}{24}-\frac{9}{24}=\frac{6}{24}$.
$\frac{6}{24}$ of \$24=\$6; $\frac{15}{24}$ of \$24=\$15; 6+15=\$21 B.
\$24—\$21=\$3 A, ANS.

(120) \$.11—\$.10½=½ ct.; 30+15=45; 45÷½=90 lbs., ANS.

(121) 5 pears + 6 peaches=28 cts.
6 " +3 " =21 "
And 12 pears + 6 peaches=42 cts.
5 " +6 " =28 "

7 pears=	14 cts.
1 " =	2 "
1 peach=	3 " ANS.

(122) 10 at 50¢=\$5.00.
\$5÷4=\$1.25 each pays.
\$1.25×(10—2+4)=\$15, ANS.

(123) 40 : x :: 40 : 10=40, ANS.
40 : 10

(124) 3+4+5=12; 136÷12=11⅓.
11⅓×3=34 yr. A; 11⅓×4=45⅓ yr. B.
11⅓×5=56⅔ yr. C, ANS.

(125) $\frac{4}{5}$=\$4500; $\frac{5}{5}$=\$7500.
\$7500—\$4500=\$3000, ANS.

(126) $\frac{3}{11}$=1188; $\frac{11}{11}$=4556; $\sqrt{4556}$=66, ANS.

(127) 20 pupils for \$20=\$1.00 each
12 " " \$15=\$1.25 "

8	.25

20—17=3.
⅜ of .25=.09⅜.
(\$1.00+.09⅜)×17=\$18.59⅜, ANS.

(128) $\sqrt{9\times4}$=6, ANS.

(129) $250\times.02=5$; $9\div5=1\frac{4}{5}$ yrs.
A's is to B's as 1 to 3 or $\frac{1}{4}$ and $\frac{3}{4}$.
$\frac{1}{2}$ of $1=\frac{1}{2}$; $\frac{3}{5}$ of $3=2$.
2% of $\frac{1}{2}$ for $1\frac{4}{5}$ yrs.$=.018$;
2% of 2 for $1\frac{4}{5}$ yrs.$=.072$;
$.018+.072=.09$ sum of interests.
$.09\times25\times10=22.50$.
$(\$180\div22.50)\times100=\$800$.
$\frac{1}{4}$ of $\$800=\$200$ A's;
$\frac{3}{4}$ of $\$800=\$600$ B's, ANS.

(130) $\sqrt{(15)^2-(7\frac{1}{2})^2}=12.9+$; $\frac{1}{3}$ of $12.9+=4.3+$.
$4.3+\times2=8.6+$, ANS.

(131) $\sqrt{(3)^2+(4)^2}=5$ in., ANS.

(132) $\sqrt{(60)^2\times.7854}=53.1+$ rds., ANS.

(133) $\frac{1}{2}$ A$=21780$ sq. ft.; $21780\div3=7260$ ft., ANS.

(134) $173.2\times2=346.4$.
$\sqrt{346.4}=18.61+$, ANS.

(135) $2+3=5$; $125\div5=25$; $\sqrt{25}=5$.
$5\times2=10$.
$5\times3=15$, ANS.

(136) $3+4=7$; $\frac{3}{7}$ of $3\frac{1}{2}=1\frac{1}{2}$ ft. from strong man, ANS.

(137) $12\times5\%=.60$; $.60-.20=40\%$.
$(40\times100)\div20=200\%$, ANS.

(138) $100\div1\%$ of $.005=2000000$, ANS.

(139) $\frac{3}{5}+\frac{4}{5}=\frac{7}{5}$; $\$3\div\frac{7}{5}=\$1\frac{2}{7}$ B; $\$3-\$1\frac{2}{7}=\$1\frac{5}{7}$ A, ANS.

(140) $(18)^2+(6)^2=360$; $360\div2=180$.
$\sqrt{180}=13.4$; $13.4-6=7.4$.
$18\times12=216$; $18-6=12$; $216\div12=18$.
$\sqrt{18\times7.4}=11.5+$; $18-11.5+=6.5$ ft., ANS.

(141) $12\times12=144$; $(12+2)\div2=7$; $144\times7=1008$.
$(144\times2)\div2=144$; $10\div2=5$; $\frac{1}{3}$ of $144\times5=240$.
$(1008+144+240)\div144=9\frac{2}{3}$ ft., ANS.

(142) $\sqrt{70756 \div 4} = 133$ width; $133 \times 4 = 532$ length.
$(133 + 532) \times 2 = 1330$; $1330 \div 7 = 190$, ANS.

(143) $\sqrt{9 \times 16} = 12$, ANS.

(144) $(12 \times 16) \div (12 + 16) = 6.8+$, ANS.

(145) $(30)^2 = 900$; $\sqrt{\frac{2}{3} \text{ of } 900} = 24.5+$, ANS.

(146) $625 \div 62.5 = 10$ cu. ft., ANS.

(147) $8 \div (8 - 6) = 4$, ANS.

(148) \$1 at 5% for 8 yrs. = .40;
\$800 ÷ .40 = \$2000, ANS.

(149) $25 + 20 + 15 = 60$; $60 \div 2 = 30$ half sum.
$\sqrt{30 \times 5 \times 10 \times 15} = 150$ area of triangle.
$(150 \times 2) \div 25 = 12$ ft.; $12 + 18 = 30$ ft. height of house, ANS.

(150) \$375 ÷ \$75 = 5 A.
$5 \times 160 = 800$ sq. rds.
$\sqrt{800 \times 2} = 40$ rds. 1 side.
$40 \times 3 = 120$ rds., ANS.

(151) The hour-hand moves a certain distance from 5. The minute-hand must gain 25 minutes + 2 dis. from 5. While the hour-hand moves 1 dis. the minute-hand moves 12 dis.
∴ 25 min. + 2 dis. = 12 dis. or 25 min. = 10 dis.
$25 \div 10 = 2\frac{1}{2}$ min. hour-hand moves.
$2\frac{1}{2} \times 12 = 30$ min. minute-hand moves, ANS.

(152) $3 + 2 = 5$; $\frac{3}{5}$ of $10 = 6$; $\frac{2}{5}$ of $10 = 4$.
$(6 \div 2) \times (4 \div 2) = 6$; 43560 ft. ÷ 6 = 7260, ANS.

(153) $3 \times 15° = 45°$ east, ANS.

(154) $\sqrt{(80)^2 + (100)^2} = 128+$; $\sqrt{(100)^2 + (100)^2} = 141+$.
$128 + 141 + = 269+$ ft., ANS.

(155) The money will run 10 and 5 yrs. respectively.
Am't of \$1 at 10% for 10 yrs.=\$2.00
" " " " 5 " =\$1.50
\$3.50
\$1400÷\$3.50=\$400; \$400×1.50=\$600.
\$400×2.00=\$800, ANS.

(156) 168÷2=sum of 2 sides=S=84.
If X=one side, S—X=other.
X(S—X)=area=$10\frac{4}{5}\times 160=1728$ sq. rds.
$\sqrt{X^2-84X+(42)^2}=\sqrt{1764-1728}$.
X—42=± 6. Sides=42+6=48 and 42—6=36, ANS.
NOTE.—Many of the solutions of problems in this list can be explained by such general formulæ.

(157) $\sqrt{(2)^2-(1)^2}=1.732$; $1.732\times 3=5.196$ area of triangle.
$(4)^2\times .7854=12.566$ area of wheel.
(12.566—5.196)÷3=2.456 part in the water.
$\frac{2.456}{12.566}=.195+$, ANS.

(158) $(100)^2 : (200)^2 :: 4 : 16$ da., ANS.

(159) 6—4=2; $\frac{2}{6}=12$ ft.; $\frac{6}{6}=36$ radius.
36×2=72 ft. diameter, ANS.

(160) 128÷3.1416=40.74+ diameter.
40.74÷2.1547+=18+, ANS.

(161) ½ of (75+90)=82½ rds.; ½ mi.=160 rds.
(160×82½)÷160=82½ A; 82½×\$80=\$6600, ANS.

(162) $(10)^2\times .7854\times\frac{1}{3}$ of 15=392.7 solidity of cone;
$(5)^2\times .7854\times 30\frac{1}{4}\times 9=5345.622+$ area of land;
392.7÷5345.622+=.0734+ ft., ANS.

(163) $(6)^2\times 2.828+=101.80+$ cu. in., ANS.

(164) 1st term .03; No. terms 11; ratio 8.
$(8)^{10}\times\$.03=\$32212254.72$ last term.
$$\frac{\$32212254.72\times 8}{(8-1)}=\$36814005.39, \text{ ANS.}$$

(165) Side$=\frac{14}{2}+\sqrt{\frac{(10)^2}{2}-\frac{(14)^2}{2}+\frac{(14)^2}{4}}=7+1=8.$
14—8=6, ANS.

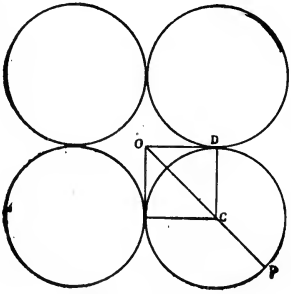
(166) P. W. of \$6400 for 8 mos. at 5%=\$6186.67+.
\$6400—\$6186.67+=\$213.33— dis.
\$213.33—(5% of \$6186.67 for 8 mos.)=\$7.11+, ANS.

(167) $\frac{2}{3}=\frac{2}{5}$; $\frac{3}{3}=\frac{6}{10}$; $\frac{6}{10}+\frac{10}{10}=\frac{16}{10}$; $\frac{10}{16}=.625$ D; $\frac{6}{10}=.375$ A.
$.375\div$ Am't of \$1 for 6 yrs.$=.23\frac{7}{16}$
$.625\div$ " " " " 2 " $=.52\frac{1}{12}$
$.75\frac{25}{48}$
$(\$290\div.75\frac{25}{48})\times.23\frac{7}{16}=\$90$
$(\$290\div.75\frac{25}{48})\times.52\frac{1}{12}=\$200$, ANS.

(168) 20=G. C. D. or side of each field.
$(320\div 20)\times(180\div 20)=144$, ANS.

(169) $(20)^2\times 16=6400$ ft., ANS.

(170)



CD=1
$OC=\sqrt{1^2+1^2}=1.414.$
OP=1.414+1=2.414.
OP : (CP=CD) : : 10 ft. : (X).
2.414 : 1 : : 10 ft. : 4.14, ANS.

(171) $(7\frac{1}{2})^2=\frac{225}{4}$.

$904\frac{1}{16}$ ft. $\div\frac{225}{4}=16\frac{1}{12}$ ft., ANS.

(172) $\sqrt{(12)^2-(35\times4)}=2$, ANS.

(173) $(16\div2)+(2\div2)=9$.

$(16\div2)-(2\div2)=7$, ANS.

(174) $(3)^2=9$; $\frac{1}{4}$ of $9=2.25$; $\sqrt{180+2.25}=13.5$.

$13.5-(\frac{1}{2}$ of $3)=12$.

$12+3=15$, ANS.

(175) $[(7)^3-133]\div(3\times7)=10$.

$\sqrt{(7)^2-10\times4}=3$; $(\frac{1}{2}$ of $3)+(\frac{1}{2}$ of $7)=5$.

$7-5=2$, ANS.

(176) $4\times(\sqrt{2}+1)=9.656+$; $9.656+\times2=19.31+$, ANS.

(177) $\sqrt{\frac{1}{2}$ of $(41-9)}=4$.

$\sqrt{41-16}=5$, ANS.

(178) $(19)^2-193=168$.

$\sqrt{193-168}=5$; $\frac{1}{2}$ of $(19-5)=7$.

$19-7=12$, ANS.

(179) $65-(7)^2=16$.

$\sqrt{65+16}=9$.

$(\frac{1}{2}$ of $9)+(\frac{1}{2}$ of $7)=8$.

$9-8=1$, ANS.

(180) $20\div12=1\frac{2}{3}$.

$1\times3.1416=3.1416$.

$\sqrt{(1\frac{2}{3})^2+(3.1416)^2}\times12=42.79+$ ft., ANS.

(181) \$12×7=\$84; \$5×12=\$60; 84—60=\$24.

12—7=5; \$24÷5=\$4.80, ANS.

(182) $(6)^3 : (3)^3 :: 25 : 3.12+$ lbs., ANS.

(183) $(3)^2+(5)^2=34$; $\sqrt{30600 \div 34}=30$.
$30 \times 3 = 90$.
$30 \times 5 = 150$, ANS.

(184) $\frac{3}{5}=\$1200$; $\frac{5}{5}=\$2000$; $\$1200+\$500=\$1700$.
$\$2000-\$1700=\$300$, ANS.

(185) $4 \times 3=12$, difference between the youngest and oldest.
$\frac{1}{2}=12$; $\frac{2}{2}=24$.
$24-4=20$.
$20-4=16$.
$16-4=12$, ANS.

(186) A has 3 times as many as B.
$\frac{1}{3}+\frac{3}{3}=\frac{4}{3}$; $60 \div \frac{4}{3}=45$ A.
$\frac{1}{3}$ of $45=15$ B, ANS.

(187) 8=G. C. D.; $(8)^2=64$, ANS.

(188) $\$5 \div (\frac{100}{116}-\frac{100}{124})=\$89.90$, ANS.

(189) 4500 : 3000 :: 27 : 11
1800 : (1100). ANS, 1100 mi.

(190) $(8 \div .866) \times 3.1416=28.99+$, ANS.

(191) $\sqrt{[(100)^2+2800] \div 2}=80$.
$\sqrt{(100)^2-2800}=60$.
$(80 \times 60) \div 160=30$ A, ANS.

(192) $135 \div 9=15$; $15+9=24$.
$24 \div 2=12$.
$12-9=3$, ANS.

(193) $(10)^2 \times .7854=78.54$ area of circle.
$\sqrt{(10)^2-(5)^2}=8.66+$.
$8.66 \times 5=43.3$ area of triangle.
$43.3-\frac{1}{2}$ of $78.54=4.03$ sq. ft., ANS.

(194) $60 \times 1.154 \times 3 \times .80=\$166.17+$, ANS.

(195) $24\times2.41+=57.84+$ side of field.
$(57.84)^2\div160=20.9+$ A, ANS.

(196) $(24\div2)^2=144$; $\sqrt{144-140}=2$ difference of sides.
$\sqrt{144}=12$; $12+2=14$.
$24-14=10$, ANS.

(197) $4\div2=2$; $\sqrt{140+(2)^2}=12$.
$12+2=14$.
$14-4=10$, ANS.

(198) $[(30)^2-(6)^2]\div2=432$.
$\sqrt{432+(3)^2}=21$; $21+3=24$; $24-6=18$.
$18\times24=432$, ANS.

(199) $\sqrt{25}=5$; $5\times4=20$.
$(20\div\sqrt{25})^2=16$, ANS.

(200) $\sqrt{420-224}=14$ C.
$224\div14=16$ J, ANS.

(201) $1:\frac{1}{4}::10:2\frac{1}{2}$ ft., ANS.

(202) 6 of the smaller circles will be tangent to the 7th located at center, and will touch the outer large circle.
$15\div3=5$ ft., ANS.

(203) $8:10::1:(1\frac{1}{4}$ ft.), ANS.

(204) $7\frac{1}{2}:5\frac{1}{2}::(18)^2:\sqrt{237.6}=15.4$.
$18-15.4=2.6$ ft. 1st piece.
$7\frac{1}{2}:3\frac{1}{2}::(18)^2:\sqrt{151.2}=12.3+$.
$18-12.3=5.7$ ft. 2d piece, ANS.

(205) $10\times(2-\sqrt{3})=2.68+$ in., ANS.

(206) $12\times\frac{1}{2}$ of $(6+4)=60$.
$12\times5\times\frac{1}{3}=\quad 20$
80 ft., ANS.

(207) $(7+17)\times30=720$; $720\div2=360$.
$17-7=10$; $17\times6=102$; $\frac{1}{2}$ of $102\times17=867$.
$867-360=507$; $\sqrt{507\times2\times6}=78$ rds.
102 rds.—78 rds.=24 rds., ANS.

(208) $3:1::10:3\frac{1}{3}$, ANS.

(209) $12\div1.154=6.9+$ ft.
or $(\sqrt{24^2-12^2})\div3=6.9+$ft., ANS.

(210) $1.0\cdot\overline{03}=\$1.01$; $10\times\$1.01=\$10.10$, ANS.

(211) $300\div6=50$ lbs., ANS.

(212) $\sqrt{\frac{1}{2}\text{ of }(74)^2}=52.3+$ ft., ANS.

(213) L. C. M.=2520; $2520+5=2525$, ANS.

(214) $(3)^2+(4)^2=25$; $\sqrt{(60)^2\div25}=12$.
$12\times3=36$.
$12\times4=48$, ANS.

(215) $104\div2=52$; $3\times160=480$.
$(52\div2)^2=676$; $\sqrt{676-480}=14$.
$26+14=40$.
$480\div40=12$, ANS.

(216) $(2)^2:(4)^2::300:1200$ ft., ANS.

(217) $(10)^2\times.7854\times\frac{1}{2}=39.27$ cu. ft., ANS.

(218) $(3)^2\times.7854=7.0686$.
$(56\times3)\div7.0686=23.76+$ ft., ANS.

(219) $\frac{1}{2}$ of $(20+15)=17.5$; $(17.5)^3\times.5236=2806+$ cu. ft., ANS.

(220) $12\div3=4$; 4=side of equilateral triangle.
6.16+ =area of equilateral triangle.
$6.16:43560::1:7071+$ A, ANS.

(221) $100\times80\times120=960000$.
Area of triangle whose sides are 100, 80 and 120=3968+.
$960000\div(3968\times4)=60.48+$, ANS.

(222) $\sqrt{(12)^2-(6)^2}=10.3$; $(10.3\times12)\div(10.3+12)=5.5$ in., ANS.

(223) $(6\times8)\div(6+8)=3\frac{3}{7}$, ANS.

(224) In the triangle A B C, let AB=12; BC=16; AC=20. Bisect the angles. The point of intersection O will be the center of the circle. From O draw OM perpendicular to AB; ON to BC; OP to AC. In the 3 pairs of equal triangles AP=AM; PC=CN; BN=BM. Perimeter=2 AP+2 PC+2 BN=48.
(÷2), AP+PC+(BN=OM=R)=24.
AP+PC=20.
24—20=4 R; $4\times2=8$ diameter, ANS.

(225) $\sqrt{(20.5)^2-(4.5)^2}=20$; $20\times4\frac{1}{2}\times2=180$.
$20+20+9=49$; $180\div49=3.6+$.
$3.6+\times2=7.2+$ ft., ANS.

(226) $5\div5\frac{10}{23}\%=92\%$, ANS.

(227) $\sqrt{\frac{1}{2}\text{ of }(20)^2}=14.1+$.
$(14.1)^2\times\frac{2}{5}=80$ sq. in., ANS.

(228) $(5)^2+(7)^2=74$; $518\div74=7$.
$(5)^2\times7=175$.
$(7)^2\times7=343$, ANS.

(229) 3.1416 : 5 :: 10 : Ans.=15.9+ miles, ANS.

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